

Introduction

- Mediterranean countries produce high volumes of fruits and vegetables and cereals .
- Occurrence of toxigenic molds and mycotoxin formation can be a problem in the Mediterranean basin, as in other parts of the world.
- The most important mycotoxins occurring in Mediterranean crops are aflatoxins (B1, B2, G1 and G2) and ochratoxin A.

The background of the slide is a microscopic image showing plant tissue with several elongated, reddish-brown structures. In the upper right, there is a circular, textured structure resembling a sunflower head or a similar botanical specimen.

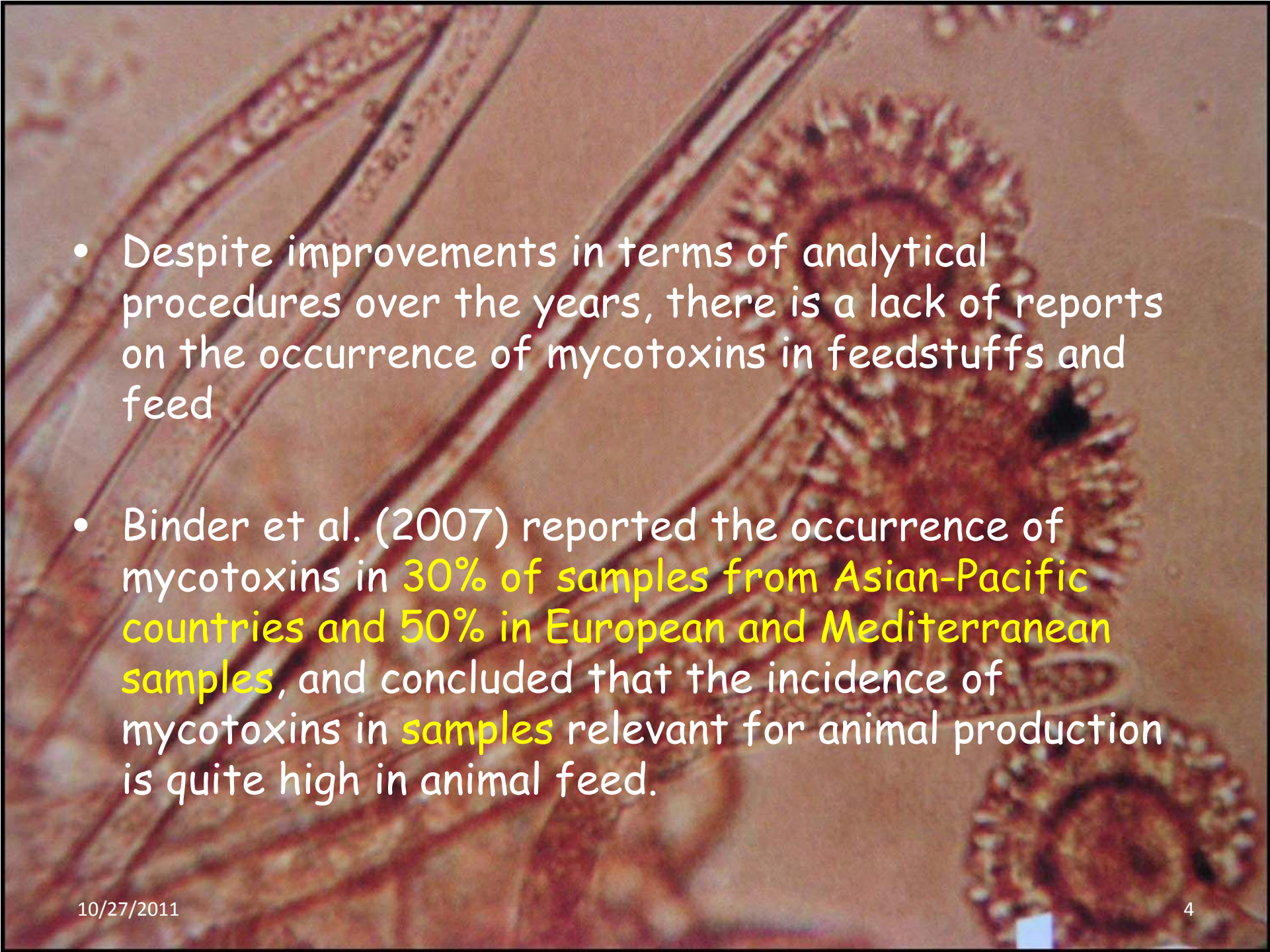
Introduction

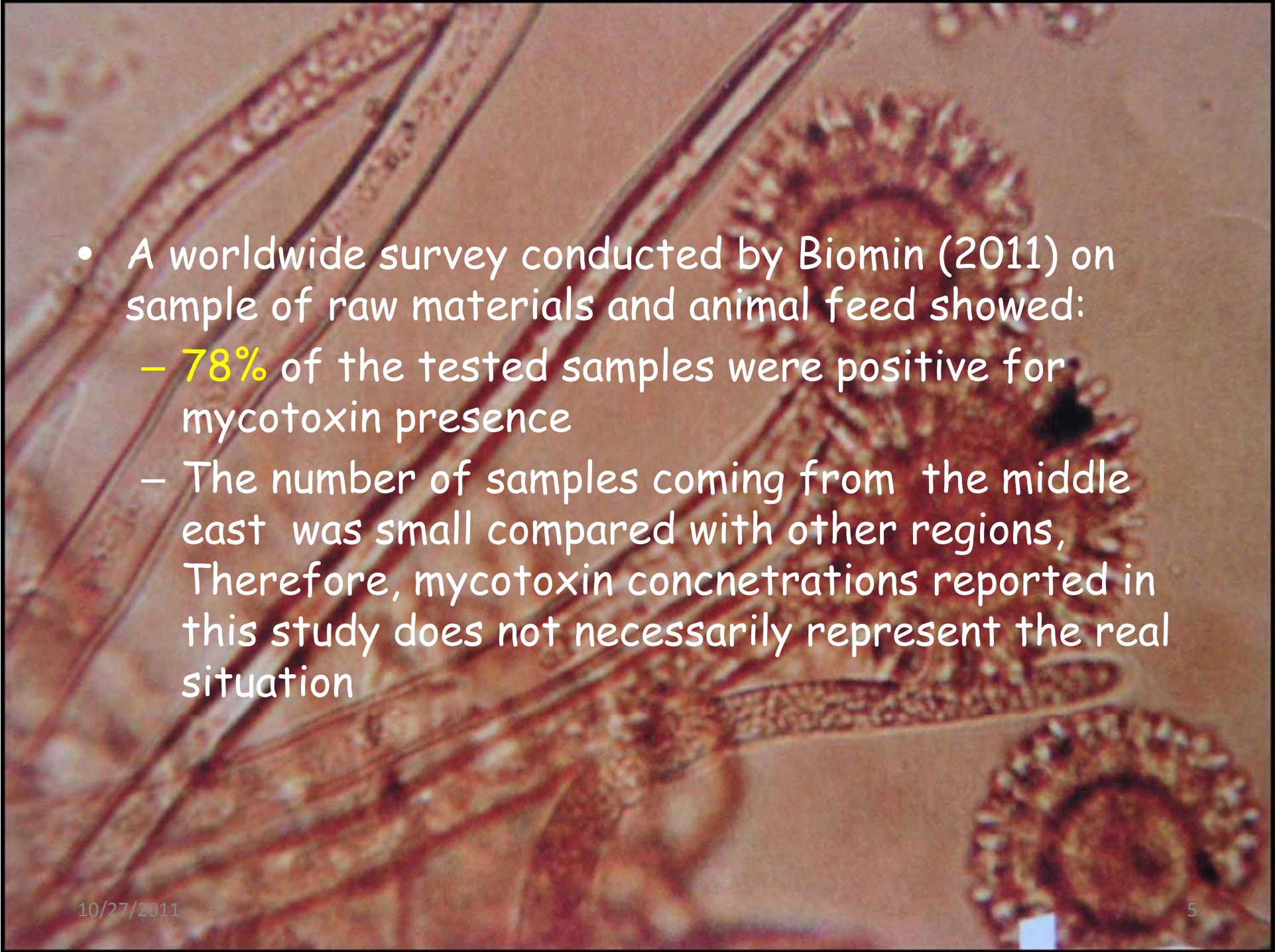
- Aflatoxin contamination of dried fruits and nuts is widespread in the southern and eastern parts of the Basin while ochratoxin A occurs in dried vine fruits. And cereals
- In the northern basin (European Mediterranean countries) trichothecenes, fumonisins (in cereals), and ochratoxin A (in grapes) are the most commonly occurring mycotoxins.



Introduction

- The present talk will focus on the occurrence of mycotoxins in food, food and feed products in the eastern and southern Mediterranean Basin, apart from Turkey which was covered this morning

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- A microscopic image of plant tissue, likely a cross-section of a stem or root, showing several elongated, parallel cells. The cells are stained, and there are numerous small, dark, circular structures scattered throughout, which appear to be fungal spores or hyphae, indicating a fungal infection or the presence of mycotoxins.
- Despite improvements in terms of analytical procedures over the years, there is a lack of reports on the occurrence of mycotoxins in feedstuffs and feed
 - Binder et al. (2007) reported the occurrence of mycotoxins in 30% of samples from Asian-Pacific countries and 50% in European and Mediterranean samples, and concluded that the incidence of mycotoxins in samples relevant for animal production is quite high in animal feed.

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- A worldwide survey conducted by Biomin (2011) on sample of raw materials and animal feed showed:
 - **78%** of the tested samples were positive for mycotoxin presence
 - The number of samples coming from the middle east was small compared with other regions, Therefore, mycotoxin concentrations reported in this study does not necessarily represent the real situation

Biomin Survey 2010

Table 2 - Survey results by geographic region.

Table 2a - North Asia (includes China, Taiwan, Korea, Japan)

North Asia	Afla	ZON	DON	FUM	OTA
Number of tests	720	774	778	732	702
Percent Positive (%)	13	56	71	44	22
Average ($\mu\text{g}/\text{kg}$)	9	232	757	780	1
Maximum ($\mu\text{g}/\text{kg}$)	4,687	16,712	19,141	13,862	60

Table 2b - South East Asia (includes Malaysia, Philippines, Thailand, Vietnam, Indonesia)

South East Asia	Afla	ZON	DON	FUM	OTA
Number of tests	369	369	369	369	369
Percent Positive (%)	65	49	41	57	32
Average ($\mu\text{g}/\text{kg}$)	22	55	299	493	1
Maximum ($\mu\text{g}/\text{kg}$)	726	2,601	19,096	6,196	53

Table 2c - South Asia (includes India, Pakistan, Bangladesh)

South Asia	Afla	ZON	DON	FUM	OTA
Number of tests	89	89	89	89	89
Percent Positive (%)	88	30	30	58	71
Average ($\mu\text{g}/\text{kg}$)	78	14	47	323	9
Maximum ($\mu\text{g}/\text{kg}$)	593	297	556	1852	174

Table 2d - Oceania (includes Australia and New Zealand)

Oceania	Afla	ZON	DON	FUM	OTA
Number of tests	153	153	153	149	149
Percent Positive (%)	11	18	26	9	15
Average ($\mu\text{g}/\text{kg}$)	2	36	105	87	2
Maximum ($\mu\text{g}/\text{kg}$)	51	926	1,559	3,229	111

Table 2e - North America (includes USA and Canada)

North America	Afla	ZON	DON	FUM	OTA
Number of tests	86	262	262	243	73
Percent Positive (%)	8	52	87	49	12
Average ($\mu\text{g}/\text{kg}$)	2	124	1487	695	0
Maximum ($\mu\text{g}/\text{kg}$)	69	2,593	24,900	22,900	14

Table 2f - South America (includes Brazil)

South America	Afla	ZON	DON	FUM	OTA
Number of tests	420	191	157	431	62
Percent Positive (%)	22	57	27	88	6
Average ($\mu\text{g}/\text{kg}$)	2	129	73	2515	0
Maximum ($\mu\text{g}/\text{kg}$)	273	5,930	2,520	53,700	1

Table 2g - North Europe (Norway, Sweden, Finland, Denmark, Lithuania and Russia)

North Europe	Afla	ZON	DON	FUM	OTA
Number of tests	11	69	68	5	20
Percent Positive (%)	0	3	62	40	25
Average ($\mu\text{g}/\text{kg}$)	0	1	665	92	1
Maximum ($\mu\text{g}/\text{kg}$)	0	65	10,440	236	10

Table 2h - Central Europe (Austria, Belgium, Germany, France, Hungary, Romania, Slovakia, Slovenia, Poland and Ukraine)

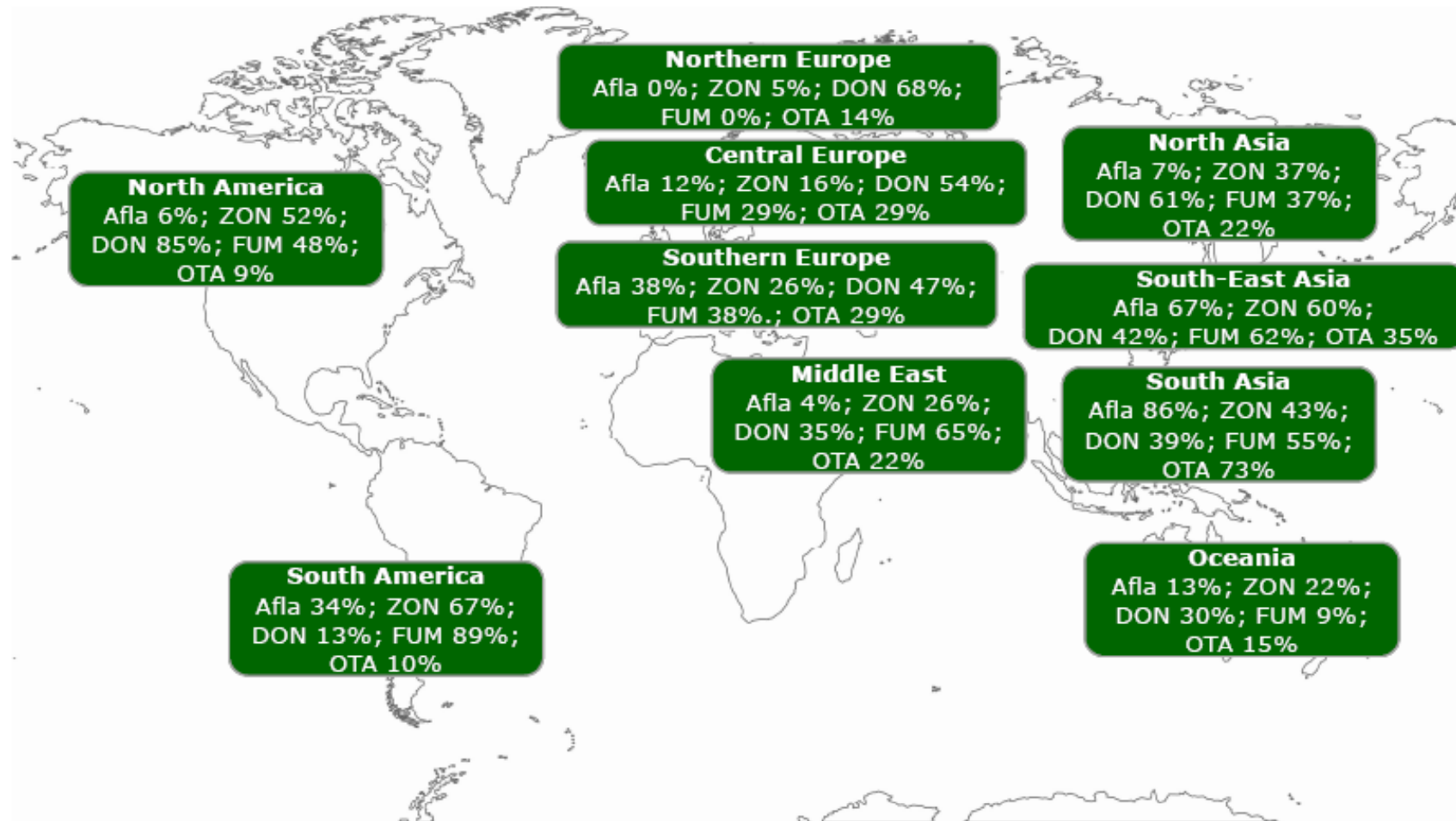
Central Europe	Afla	ZON	DON	FUM	OTA
Number of tests	29	643	972	41	46
Percent Positive (%)	14	26	60	32	28
Average ($\mu\text{g}/\text{kg}$)	0	30	967	608	8
Maximum ($\mu\text{g}/\text{kg}$)	2	1,045	49,000	6,770	331

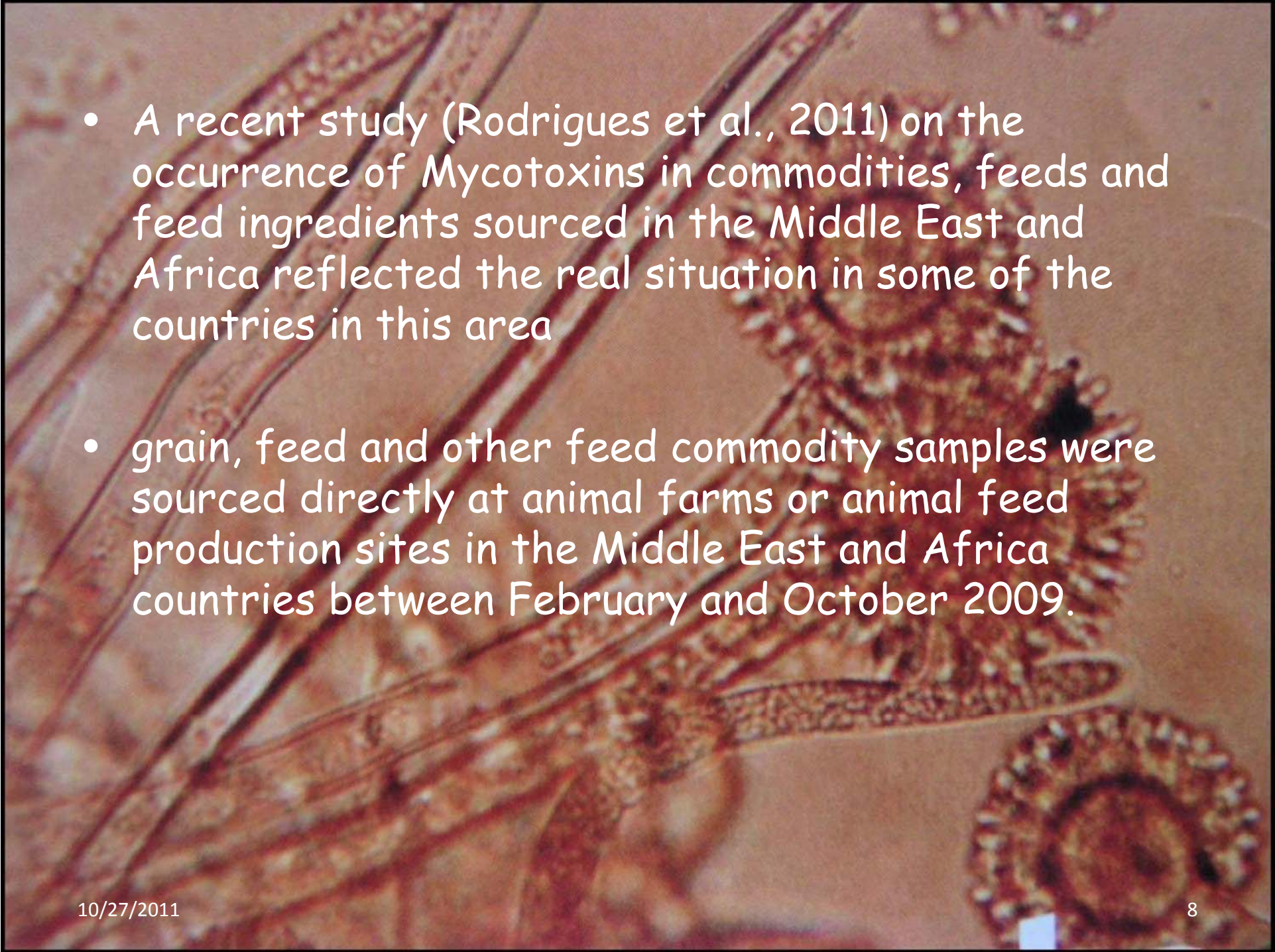
Table 2i - South Europe (Italy, Greece, Portugal and Spain)

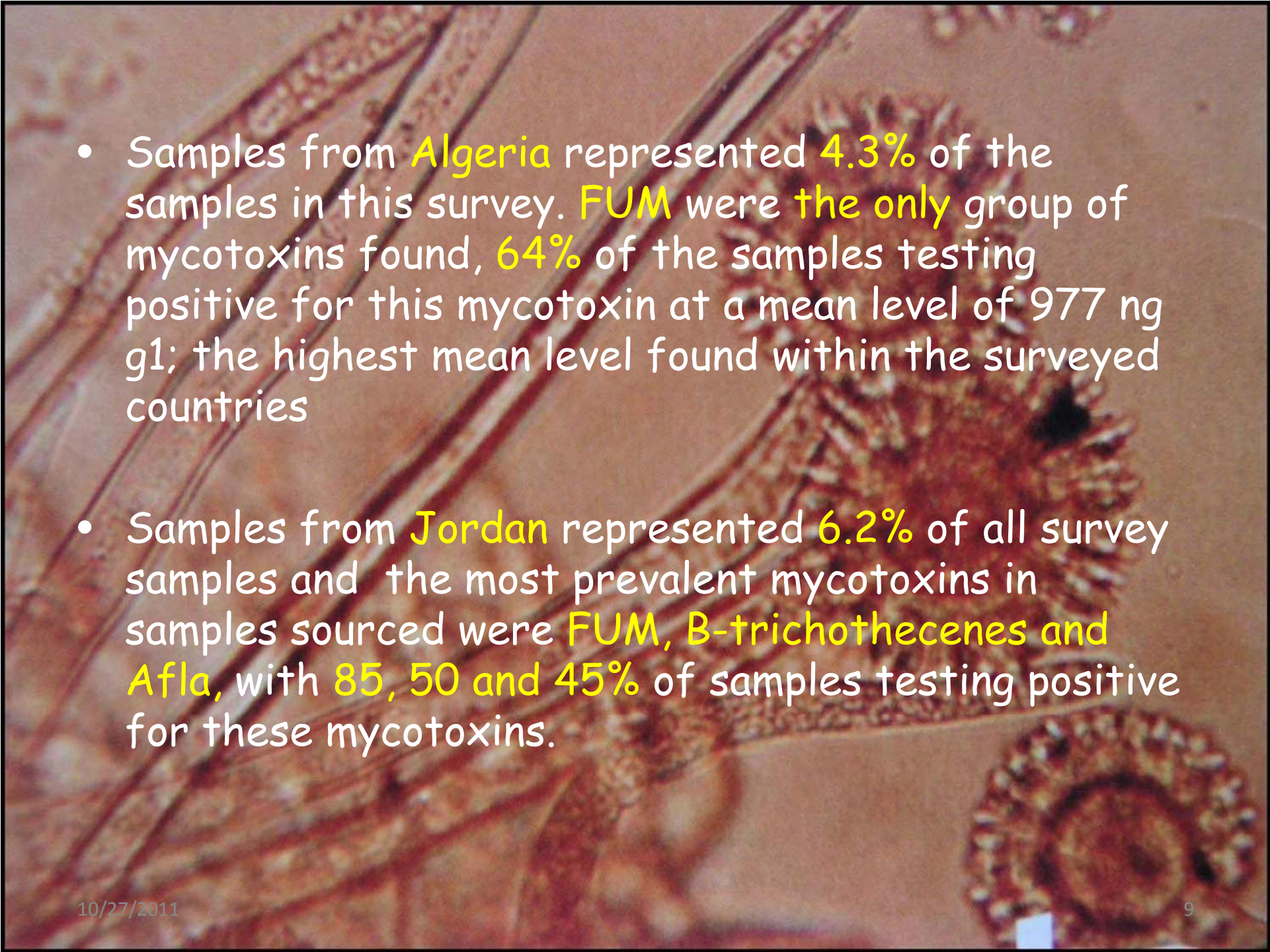
South Europe	Afla	ZON	DON	FUM	OTA
Number of tests	34	47	63	24	24
Percent Positive (%)	50	19	41	83	29
Average ($\mu\text{g}/\text{kg}$)	5	17	248	2241	0
Maximum ($\mu\text{g}/\text{kg}$)	103	237	2,160	7,260	3

Table 2j - Middle East (Algeria, Israel, Lebanon, Saudi Arabia, Sudan, Syria, United Arab Emirates and Yemen)

Middle East	Afla	ZON	DON	FUM	OTA
Number of tests	38	35	35	23	23
Percent Positive (%)	8	29	40	65	22
Average ($\mu\text{g}/\text{kg}$)	0	17	158	262	0
Maximum ($\mu\text{g}/\text{kg}$)	2	93	1,019	851	3



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- A recent study (Rodrigues et al., 2011) on the occurrence of Mycotoxins in commodities, feeds and feed ingredients sourced in the Middle East and Africa reflected the real situation in some of the countries in this area
 - grain, feed and other feed commodity samples were sourced directly at animal farms or animal feed production sites in the Middle East and Africa countries between February and October 2009.

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- Samples from **Algeria** represented **4.3%** of the samples in this survey. **FUM** were **the only** group of mycotoxins found, **64%** of the samples testing positive for this mycotoxin at a mean level of 977 ng g⁻¹; the highest mean level found within the surveyed countries
 - Samples from **Jordan** represented **6.2%** of all survey samples and the most prevalent mycotoxins in samples sourced were **FUM, B-trichothecenes and Afla**, with **85, 50 and 45%** of samples testing positive for these mycotoxins.

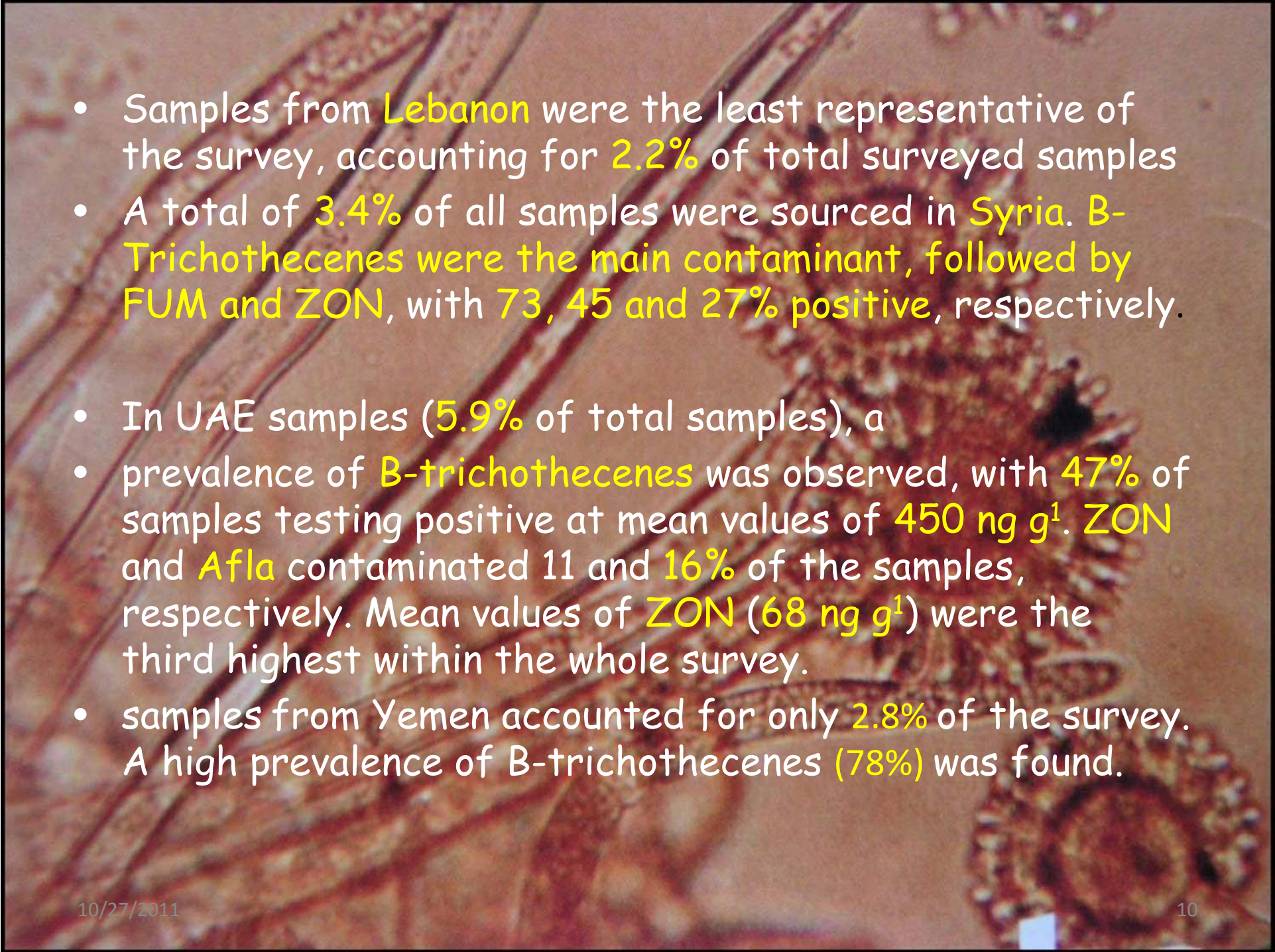
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- Samples from **Lebanon** were the least representative of the survey, accounting for **2.2%** of total surveyed samples
 - A total of **3.4%** of all samples were sourced in **Syria**. **B-Trichothecenes** were the main contaminant, followed by **FUM** and **ZON**, with **73, 45 and 27% positive**, respectively.
 - In UAE samples (**5.9%** of total samples), a
 - prevalence of **B-trichothecenes** was observed, with **47%** of samples testing positive at mean values of **450 ng g¹**. **ZON** and **Afla** contaminated 11 and **16%** of the samples, respectively. Mean values of **ZON (68 ng g¹)** were the third highest within the whole survey.
 - samples from Yemen accounted for only **2.8%** of the survey. A high prevalence of **B-trichothecenes (78%)** was found.

Table : Mycotoxin contamination levels detected in commodities, feeds and feed ingredient samples from some surveyed Middle East countries (after Rodrigues et al., 2011, results by country and toxin group).

	DON	NIV	AcDON	FB1	FB2
Algeria					
Total samples ^a	14	14	14	14	14
Number positive	0	0	0	9	9
% positive	0	0	0	64	64
Mean (ng g ⁻¹) ^b	-	-	-	720	257
Median of positive (ng g ⁻¹) ^c	-	-	-	967	386
Maximum level (ng g ⁻¹) ^d	-	-	-	2413	675
Jordan					
Total samples	16	16	16	16	16
Number positive	6	1	3	13	10
% positive	38	6	19	81	63
Mean (ng g ⁻¹)	208	28	890	238	144
Median of positive (ng g ⁻¹)	331	440	1015	221	196
Maximum level (ng g ⁻¹)	1493	440	1293	1338	559

Table (continue): Mycotoxin contamination levels detected in commodities, feeds and feed ingredient samples from some surveyed Middle East countries (after Rodrigues et al., 2011, results by country and toxin group).

	DON	NIV	AcDON	FB1	FB2
Jordan					
Total samples ^a	20	20	20	20	20
Number positive	14	17	1	1	10
% positive	70	85	5	5	50
Mean (ng g ⁻¹) ^b	254	444	22	8	124
Median of positive (ng g ⁻¹) ^c	292	320	442	164	229
Maximum level (ng g ⁻¹) ^d	881	1627	442	164	374
Lebanon					
Total samples	7	7	7	7	7
Number positive	0	6	0	0	1
% positive	0	86	0	0	14
Mean (ng g ⁻¹)	-	157	-	-	24
Median of positive (ng g ⁻¹)	-	179	-	-	165
Maximum level (ng g ⁻¹)	-	281	-	-	165

Table (continue): Mycotoxin contamination levels detected in commodities, feeds and feed ingredient samples from some surveyed Middle East countries (after Rodrigues et al., 2011, results by country and toxin group).

	DON	NIV	AcDON	FB1	FB2
<u>Syria</u>					
Total samples ^a	11	11	11	11	11
Number positive	4	4	0	0	6
% positive	36	36	0	0	55
Mean (ng g ⁻¹) ^b	118	242	-	-	122
Median of positive (ng g ⁻¹) ^c	316	672	-	-	243
Maximum level (ng g ⁻¹) ^d	402	815	-	-	267
<u>UAE</u>					
Total samples	19	19	19	19	19
Number positive	2	2	4	0	8
% positive	11	11	21	0	42
Mean (ng g ⁻¹)	15	29	127	-	163
Median of positive (ng g ⁻¹)	143	275	613	-	318
Maximum level (ng g ⁻¹)	180	324	642	-	1000

Table (continue): Mycotoxin contamination levels detected in commodities, feeds and feed ingredient samples from some surveyed Middle East countries (after Rodrigues et al., 2011, results by country and toxin group).

	DON	NIV	AcDON	FB1	FB2
Yemen					
Total samples ^a	9	9	9	9	9
Number positive	1	2	0	0	7
% positive	11	22	0	0	78
Mean (ng g ⁻¹) ^b	22	56	-	-	191
Median of positive (ng g ⁻¹) ^c	199	251	-	-	267
Maximum level (ng g ⁻¹) ^d	199	340	-	-	323

Aflatoxins in Pistachios, Syria

Table : Number & (%) of samples from which *A. Flavus* was isolated, and its ability to produce AFB1

Stage of kernal	No. analysed Samples	NO & (%) of infected samples	Ability to produce AFB1
Kernels with exocarp & mesocarp	20	3 (%15)	+++
Kernels with endocarb	25	9 (%36)	+++
seeds	16	12 (%75)	+++

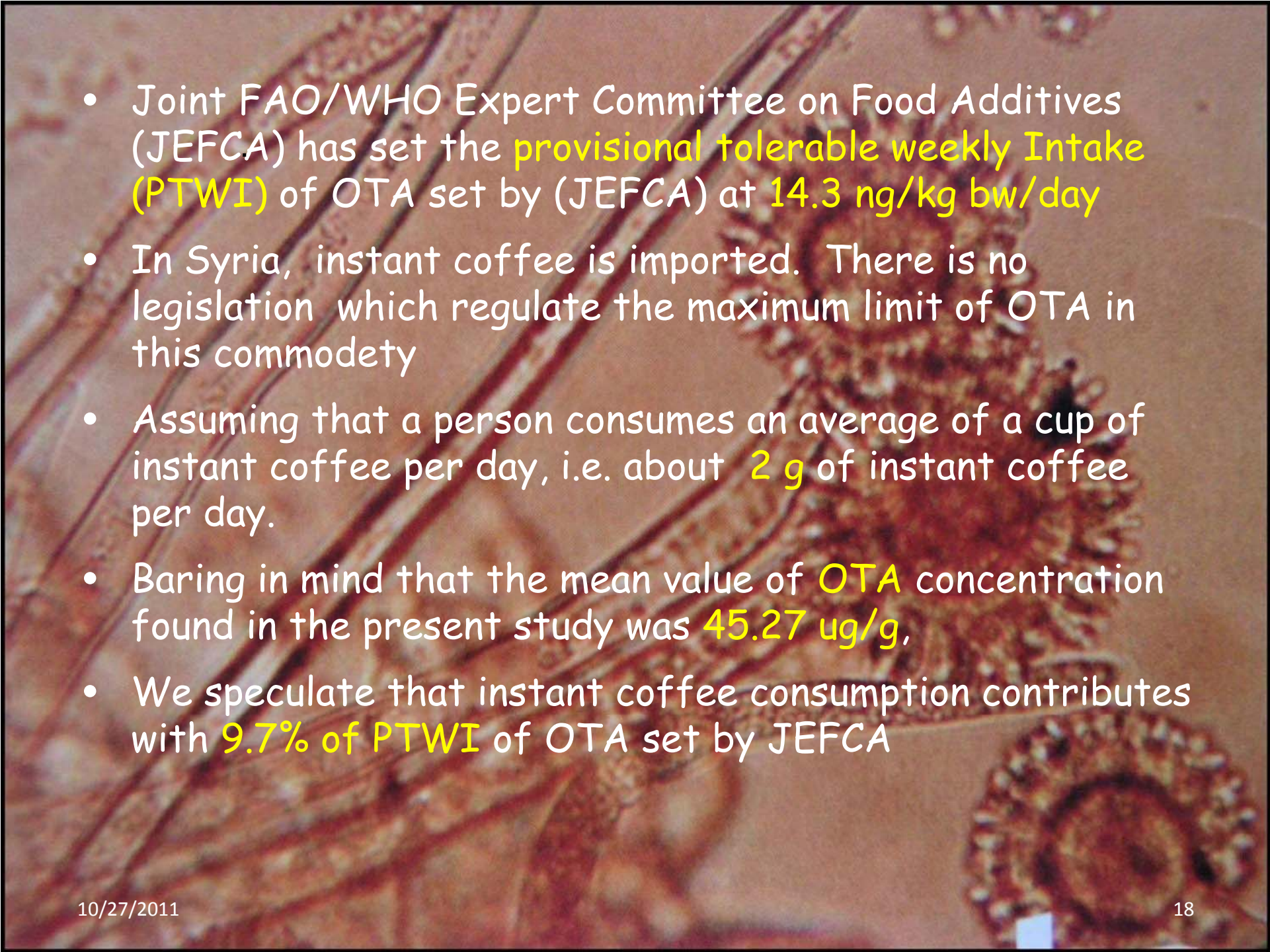
Aflatoxins in Pistachios, Syria

Table : Distribution of pistachio samples according to their AFB1 concentration

Stage of kernal	No. analysed Samples	No . Contaminated samples , (%)			Range of AFB1 concentration ($\mu\text{g}/\text{kg}$)
		AFB1 <8 $\mu\text{g}/\text{kg}$	AFB1 8-20 $\mu\text{g}/\text{kg}$	AFB1 > 20 $\mu\text{g}/\text{kg}$	
Kernels with exocarp & mesocarp	93	93 (100%)	0	0	—
Kernels with endocarp	25	5 (20%)	12 (48%)	8 (32%)	11.22 - 26.39
Seeds	16	8 (50%)	4 (25%)	4 (25%)	16.19 - 43.22

Concentration of **AFM1 in milk** samples, assayed using an ELISA kit, and extrapolated AFB1 concentrations in cattle feed

Sample category	Samples analyzed	Positive samples	AFM1 Contamination (ng/l)		Extrapolated AFB1 ($\mu\text{g/Kg}$)
			Range	Mean \pm SD	Range
Raw cow milk	74	70 (95%)	20-690	143 \pm 53.22	1.3-43.1
Raw sheep milk	23	13 (57%)	6-634	67 \pm 18.43	0.37-39.6
Raw goat milk	11	7 (64%)	8-54	19 \pm 13.8	0.5-3.37
Pasteurized milk	10	10 (100%)	8-765	492 \pm 212.56	0.5-43.8
Milk powder	8	1 (13%)	12	0.7	0.7
Total	126	101 (80%)			0.37-43.8

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- Joint FAO/WHO Expert Committee on Food Additives (JEFCA) has set the **provisional tolerable weekly Intake (PTWI)** of OTA set by (JEFCA) at **14.3 ng/kg bw/day**
 - In Syria, instant coffee is imported. There is no legislation which regulate the maximum limit of OTA in this commodity
 - Assuming that a person consumes an average of a cup of instant coffee per day, i.e. about **2 g** of instant coffee per day.
 - Baring in mind that the mean value of **OTA** concentration found in the present study was **45.27 ug/g**,
 - We speculate that instant coffee consumption contributes with **9.7% of PTWI** of OTA set by JEFCA

Source: <ftp://ftp.fao.org/docrep/fao/007/y5499e/y5499e00.pdf>

Table 3: Maximum tolerated levels of mycotoxins in foodstuffs, dairy products and animal feedstuffs (2002/2003 survey)

Country	Commodity	(Sum of) Mycotoxin(s)	Limit (µg/kg)	Legal basis	Responsible authority	Sampling method		Analytical method		Remarks
						status	ref.	status	ref.	
	complete and complementary feeds for bovine animals, sheep and goats, except milk cows, calves and lambs	afla B ₁	50	CH5	EVD					in force 1 July 1999
	complementary feeds for pigs and poultry except young animals		30							
	complete feeds for pigs and poultry except young animals		20							
	complementary feed for lactating bovine animals, lactating sheep and lactating goats		5							
	other complete and complementary feeds		10							
SYRIAN ARAB REPUBLIC [SY] 2003										
	Food									
	peanuts and pistachios	afla B ₁	5		MS MH	official		official		
	baby food	afla B ₁ B ₂ G ₁ G ₂	0.05							
	pulses, mixed nuts, oil seeds and products thereof		20							
	Dairy									
	liquid milk	afla M ₁	0.2		MS MH	official		official		
	dried milk [not used in baby food]		0.05							
	Feed									
	domestic feed	afla B ₁ B ₂ G ₁ G ₂	20		MS MA	official		official		
	livestock cattle feed		10							



Syrian Arab Standards and Metrology Organization

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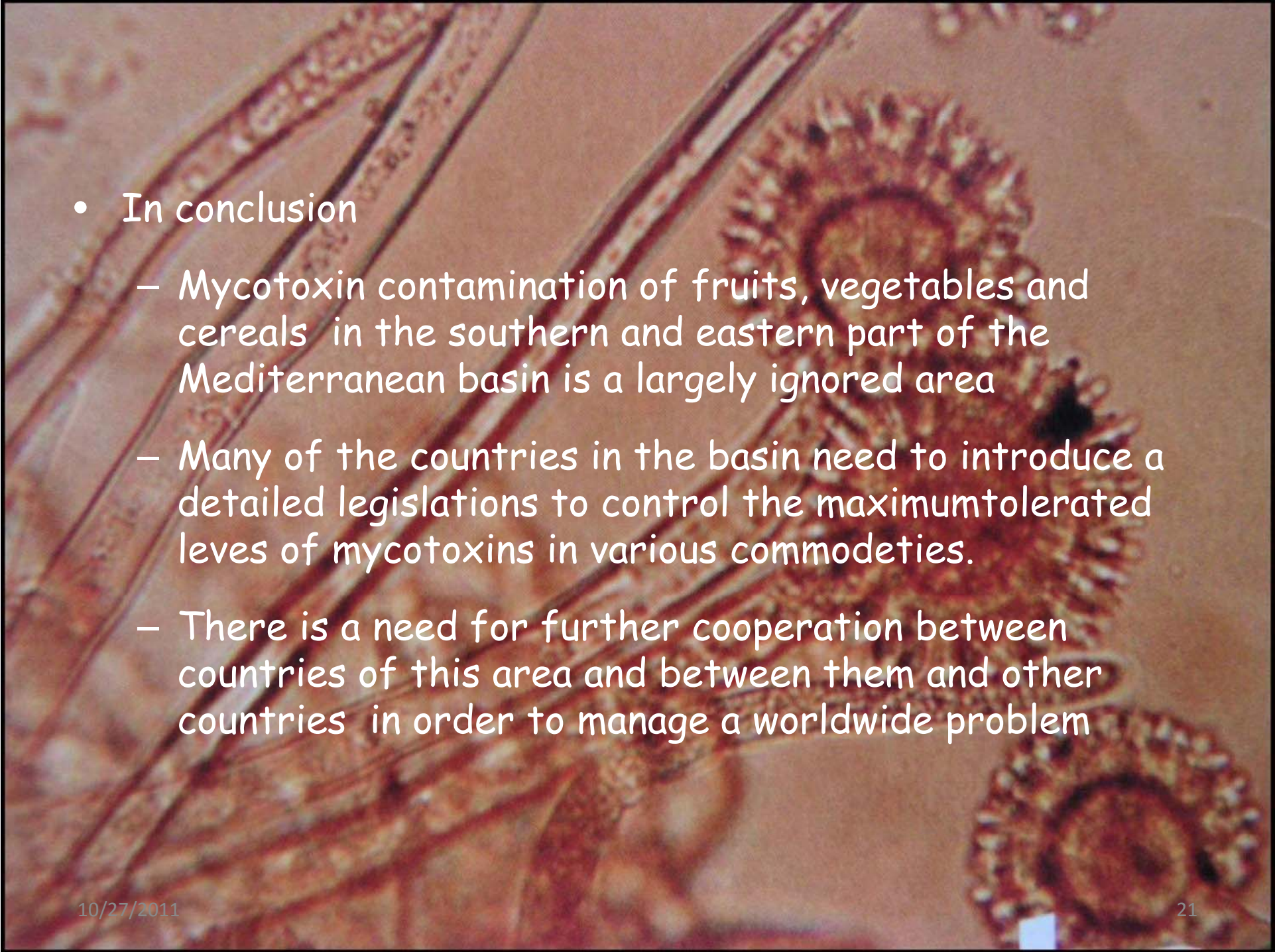
Syrian Standards Search Results

Search engine found 2 standard(s) meeting your criteria.

Standard Number	Part Number	Title	Standard Year	ICS
1963	0	Animalfeeding stuffs - determination of aflatoxin B1	1998	65.120
3353	0	Determination of aflatoxin B1and total aflatoxins in cereals,nuts and derived products	2007	67.060

10/27/2011

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- In conclusion
 - Mycotoxin contamination of fruits, vegetables and cereals in the southern and eastern part of the Mediterranean basin is a largely ignored area
 - Many of the countries in the basin need to introduce a detailed legislations to control the maximum tolerated leves of mycotoxins in various commodeties.
 - There is a need for further cooperation between countries of this area and between them and other countries in order to manage a worldwide problem