

Food fraud in herbs & spices

Sampling project in Malmö

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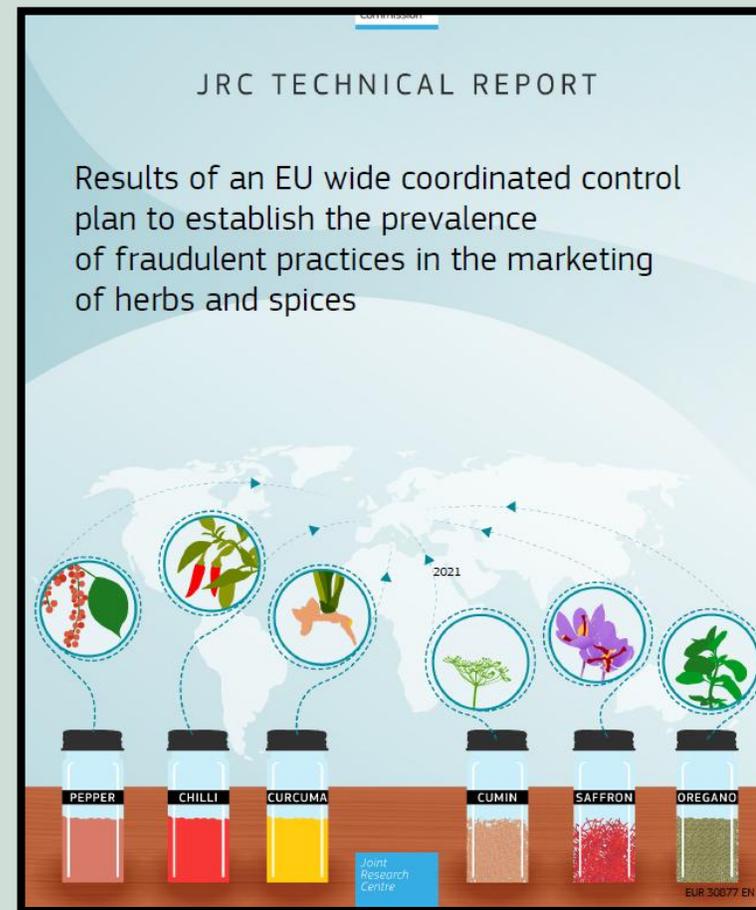
Food safety inspector/livsmedelsinspektör

Malmö stad, Sweden



Background

- Why herbs and spices?
 - Long supply chains, low risk of detection, big quantities
 - Earlier control project (48% of oregano adulterated)
- Questions to answer:
 - Products?
 - What type of fraud?
 - Analytical methods?
- Environmental scanning:
 - Reports (e.g. RASFF notifications)
 - iRASFF (fraud and brands)
 - Visited food business operators (FBO)



Initial screening – at the office

Detection of fraud	Material	Method	Indication of fraud
Bulking/dilution with starch (rice, wheat, corn)	Jodopax	Mix with distilled water and Jodopax	Produces complex with starch → Blue color
Lead (II) chromate (PbCrO ₄) yellow pigment in turmeric Dilution with calcium carbonate (CaCO ₃)	XRF	Measure elemental composition in a sample	Presence or elevated levels
Metanil yellow (dye) in turmeric	Hydrochloric acid (HCl)	A few drops in sample	Violet color
Indication of dilution or strong color	Water	Ocular/visual assessment	Different density Color



Selection of analytical methods



Analysis: Illegal dyes (e.g. Sudan)

Fraud: Non-authorized dyes

Products: 10x paprika, turmeric & chili powder



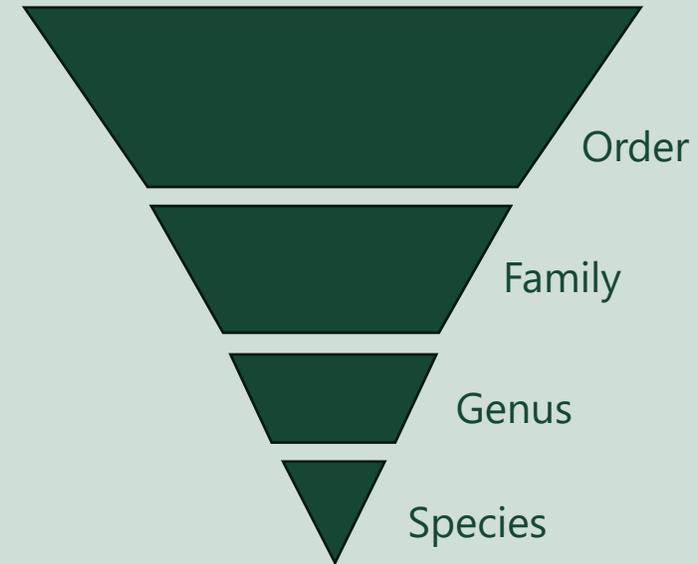
Analysis: Authenticity (DNA)

Fraud: Undeclared botanicals

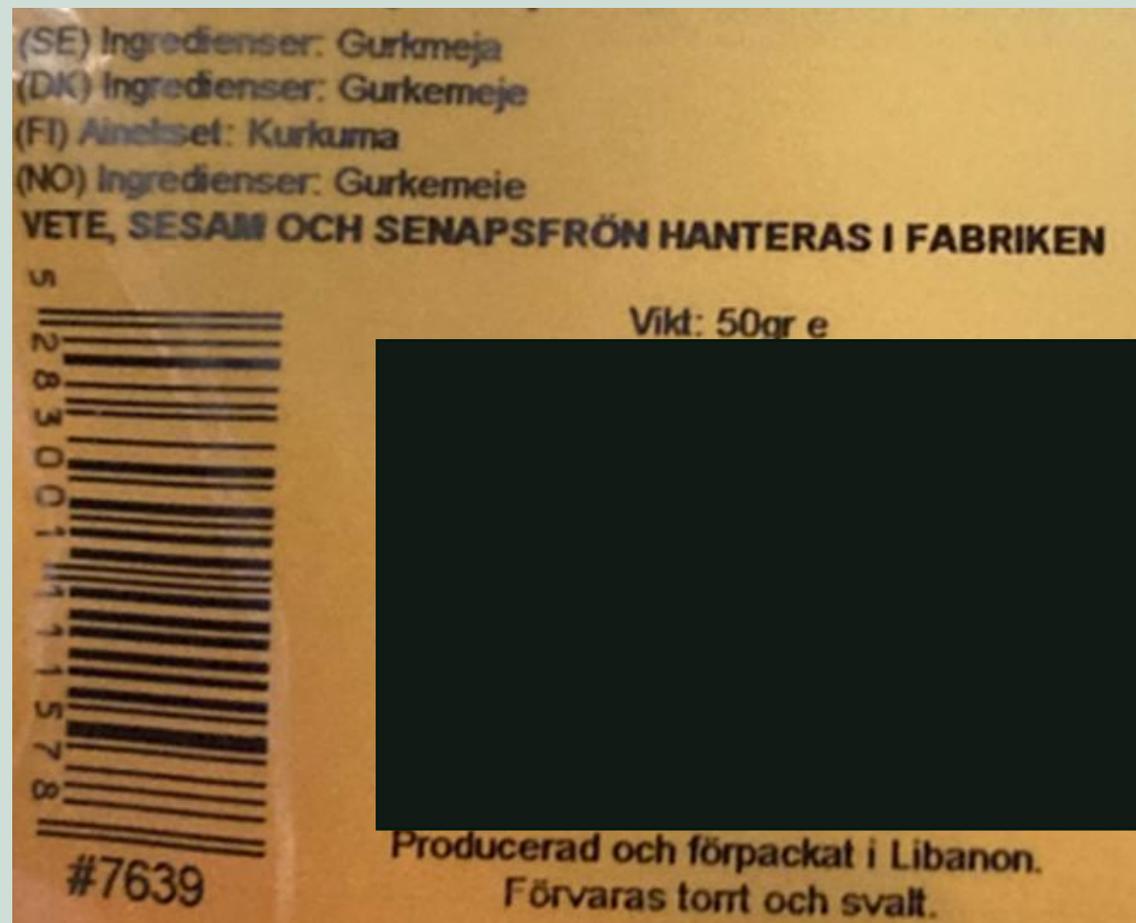
Products: 9x turmeric, oregano & chili powder

Authenticity (DNA)

- Turmeric = *Curcuma longa*
- *Curcuma spec.*
 - ~50 species



Plant (lat.)	Common Species Name	Reads [%]*
<i>Curcuma spec.</i>	-	100



1. First test

Plant (lat.)	Common Species Name	Reads [%]*
<i>Curcuma spec.</i>	-	40.4
<i>Vicia faba</i>	Broad bean	29.4
<i>Vicia spec.</i>	-	21.3
<i>Cuminum spec.</i>	-	6.8
<i>Cicer spec.</i>	-	2.1

Faba bean

2. Re-test (same batch)

Plant (lat.)	Common Species Name	Reads [%]*
<i>Curcuma spec.</i>	-	76.3
<i>Cuminum spec.</i>	-	9.3
Apiaceae	-	5.3
<i>Vicia spec.</i>	-	5.0
Fabaceae	-	2.1
<i>Trigonella foenum-graecum</i>	Fenugreek	2.0

Risk?

- Favism
- Cross-allergy with legumes

First test:

- Sales ban pending re-test
- Producer in Lebanon contacted us
- Questioned the analysis results

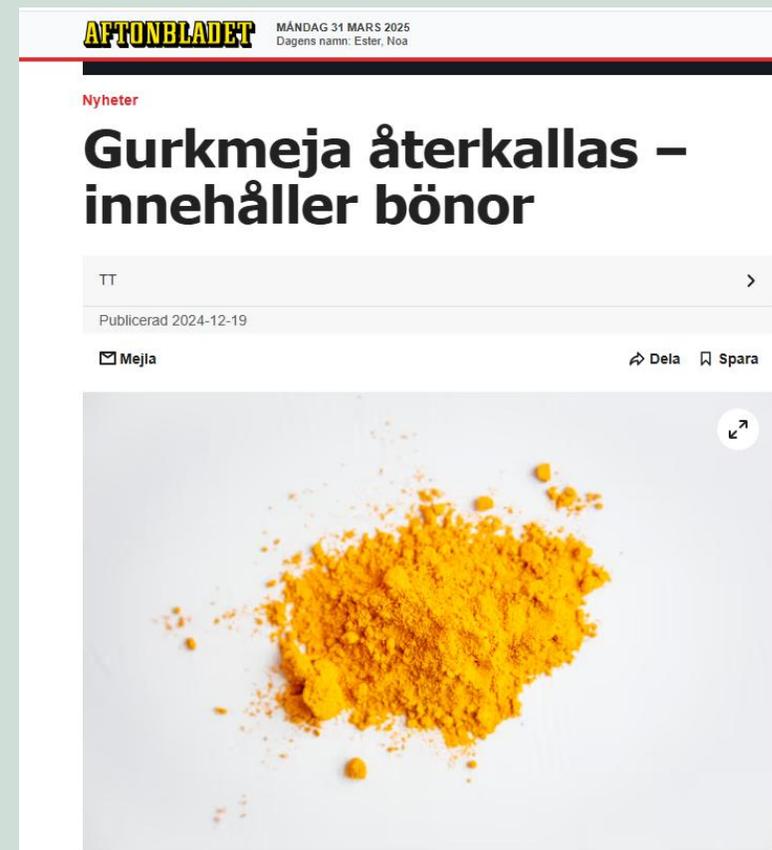
Re-test:

- Conclusion: Not only turmeric → risk
- Recall initiated

Measures taken

- ~ 11 000 consumer packages were recalled back
- ~40 municipalities i Sweden and FBOs in Finland & Denmark affected
- RASFF notification
 - "Infosan" – producer in Lebanon
 - FF (food fraud) – information to Germany

"Request to Lebanon:
this case has been
identified as product
tampering..."





Results/What happened?

- Investigation in Lebanon
 - Cross contamination
- Case included in EU Commission's monthly report on fraud suspicions

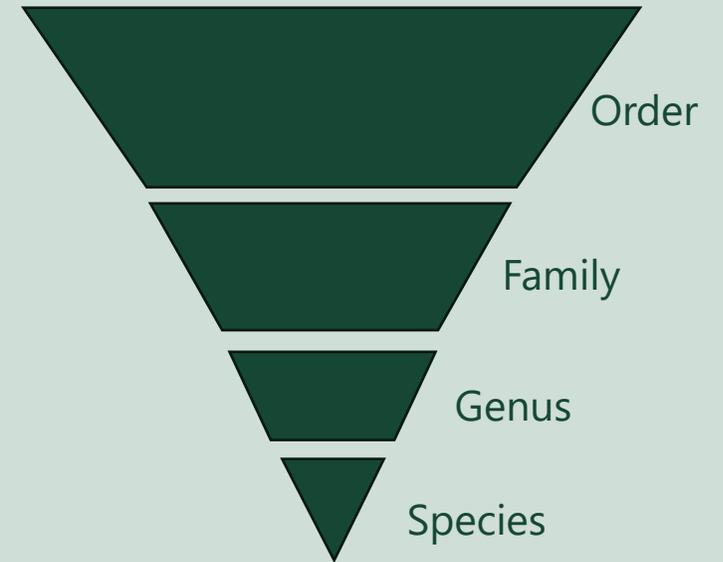
Sanctions/enforcement measures

- Injunction with continuous penalty
 - Ingredient list = content
 - Analyse the first four batches
- FBO put higher demands on their supplier in Lebanon
 - Waited several months before importing the product again

Plant (lat.)	Common Species Name	Reads [%]*
<i>Curcuma longa</i>	Turmeric	96.1
<i>Curcuma spec.</i>	-	2.8
<i>Cuminum cyminum</i>	Cumin	1.1

DNA authenticity

- 9 samples in total
- **6** assessed as "compliant"
 - Several samples only by genus
 - Genus: *Origanum*
 - Species: "*Origanum vulgare*"
 - Same genus as e.g. marjoram
- **3** as "non-compliant" or "suspicion of fraud"
 - **Oregano:** no DNA could be extracted (too denatured)
 - Informed the authority in Denmark
 - **Turmeric:** undeclared botanicals
 - Informed the authority in Sweden



Plant (lat.)	Reads [%]*
<i>Curcuma spec.</i>	94.1
<i>Allium cepa</i>	3.3
<i>Allium spec.</i>	1.9
<i>Cuminum spec.</i>	0.7

Key takeaways



Initial screening

Can help in selecting analysis and samples
Environmental scanning



ACN (RASFF)

Screening tool
Collaboration → effective control



Analytical methods

Illegal dyes: easier to assess & risk, no match
Authenticity (DNA): found more, useful indicator,
limitations



Lack of clear regulation

Difficult to assess and communicate

THANK YOU!

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