Synthite

WORLD SPICE CONGRESS

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Sustainability and Food safety – Global Initiatives

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Pune

ILLEGAL DYES

QUALITY CONTROL/ASSURANCE DEPT

SYNTHITE INDUSTRIES LTD

Agenda

- Background
- Regulation
- Possible sources of incidental contamination
- Analytical methodology
- Analytical challenges
- Conclusion

Background

- Oil-soluble, majority are aromatic compounds containing azo group (-N=N-).

- General applications:
  - Coloration of mineral products
    (e.g. diesel oil, fuel oil)
  - Coloration of wax products (e.g. shoe polish, candles)
  - Production of ball-point pen ink, felt pen ink

Background

- May 2003: European Authority reported finding of Sudan I at a level of 4000 ppm in ground capsicum .The matter of Azo dyes, used to manipulate the quality of spices, came into focus of interest.
- IARC considers Sudan I,II,III,IV as Group 3 carcinogens
- Sudan dyes have been reported as contact allergens and sensitizers.
- Rhodamine B: Potentially genotoxic and carcinogenic.
- Orange II: Potentially Genotoxic.
- Potentially all listed Illegal dyes are carcinogenic or genotoxic in Nature.

Background

- According to EFSA opinion and other international bodies following are other industrial dyes are not authorized as food colors are :

  Sudan Red 7B,Methanil Yellow,Auramine,Butter Yellow

  Malachite/ Leucomalachite Green,Acid Red, Congo Red

  Solvent Red I,Naphthol Yellow,Ponceau 3R,Ponceau MX, Oil Orange SS.

  A Detailed toxicological review is also provided for each dye in terms of both their genotoxic and carcinogenic properties

Regulation

- Sudan dyes are not permitted colors in food regulations of many countries/agencies (e.g.,UAE, EU, Australia, Canada, China, Hong Kong, …).
- Their presence, at any level is not permitted in foods
- Not authorized as food colors in the US or the EU (according to the European Parliament and Council Directive 94/36/EC)
- In response to the adulteration, the EU issued:

  -Decision 2003/460/EC requiring as a condition of import that all hot chili and hot chili products be tested for Sudan I

  -Decision 2004/92/EC to include Sudan II, III and IV

  -Decision 2005/402/EC to include turmeric and palm oil

Possible sources of incidental contamination

- The incidental contamination of dye residue in spice and oleoresins occur in the range of 10 to 100ppb.

1 Cultivation & Production :

- colored pesticides and insectides.

2 Raw Material Supply Chain:

- From inks used for the inscription of sacks.
- Usage of red bags for drying, transport and storage.
- Usage of old / used colored bags for drying, transport and storage.

Analytical methodology

- Up to now, no official method for the detection of Azo dyes in food exists
- Since 2003 certain methods have been published utilizing GC-MS or HPLC with UV or MS detection
- HPLC-UV
  - LOQ = 500 – 1000 ppb (UV detection at 505 nm)
  - Possible interferences by carotenoids present in capsicum
  - Not very specific
- LC-MS/MS
  - LOQ = 10 - 100 ppb (signal suppression could affect LOQ)
  - Spectral interferences possible (mass ratios important)
  - High selectivity, multi-methods possible

Analytical challenges

- Carry-over after the analysis of highly contaminated commodities.
- Application of an insufficient selective detection.
- False interpretation of interfering peaks.
- Complex matrix interference in oleoresins.
- Analytical uncertainty
- Results variation between the labs because of non standardization.

Conclusion

- Prohibit the usage of pesticides identified as having illegal dyes.
- Using clean new gunny bags for harvesting.
- Drying in clean yards /colorless tarpaulins.
- Packing the dried material in new gunny sacks.
- Avoid ink markings on the bags. Colorless cloth tags are attached for identification.
- Storage of the material in sanitized zones.

Conclusion

However In order to facilitate trade, the regulation can be looked into following :

1) Establishing An “Action limit” for spices on low levels of contamination because of various supply chain challenges and analytical limitations.

2) Harmonization of extraction and test procedures would help laboratories to address most of the analytical challenges.

3) Establishing enrichment factor for oleoresins.

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THANK YOU FOR YOUR COOPERATION & ATTENTION!!