

CONTAMINANTS AND HEMP

To test or not to test

FOOD SAFETY MODERNIZATION ACT 2011

**Inclusion of contaminants
specifically chemical hazards**

Risk based hazards analysis

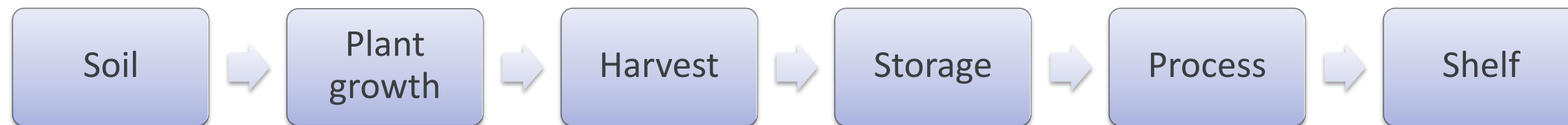
**Verification of
ingredients/suppliers
Development of specifications**



**Food Integrity
& Innovation**

RISK BASED HAZARDS ANALYSIS

Assessing sources of contamination from ground to shelf



RISK BASED HAZARDS ANALYSIS

Soil - Plant Growth

Hemp is a phytoremediator

Soil:

Heavy metals

Pesticides

Plant growth:

Fertilizers

Pesticides

Heavy metals



RISK BASED HAZARDS ANALYSIS

Harvest - Storage

- Molds
- Bacteria
- Pesticides
- Mycotoxins



RISK BASED HAZARDS ANALYSIS

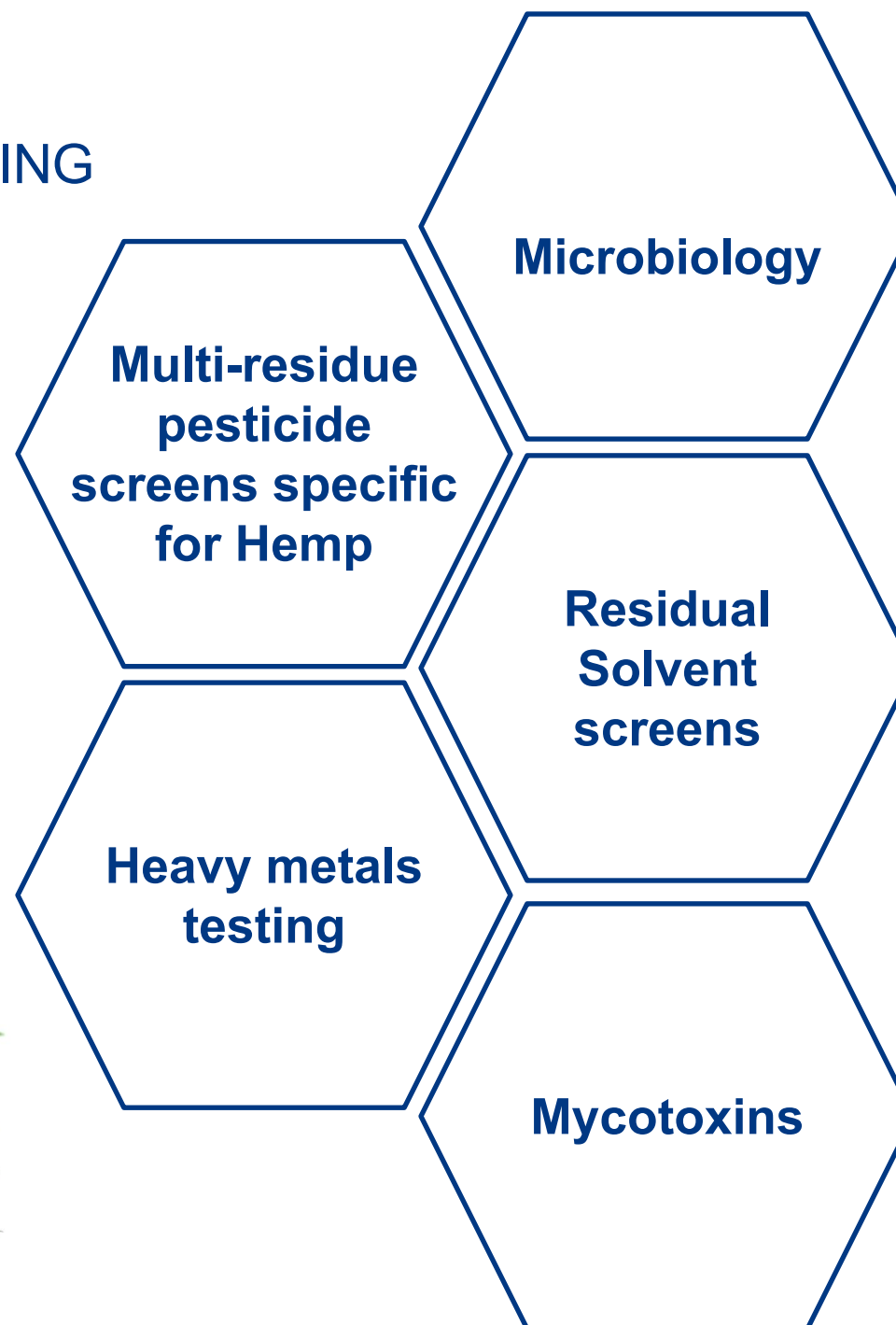
Processing - Shelf

- Solvents
 - Mycotoxins
 - Pesticides
 - Heavy metals
- } Ingredients



CONTAMINANT PROFILE

HEMP SPECIFIC CONTAMINANT TESTING



PESTICIDES

Over 6000 pesticides registered for use on crops

None registered for hemp

Economics of testing

Complexity of matrix

Which pesticides to test?

How often?

When?



PESTICIDES

- Multi-residue methods for screening
- Methods for testing
 - Extraction
 - Analysis (Instrumentation)
- Standards
 - AOAC first action methods
 - AOAC SMPRs
- Tolerances/MRLs/Action levels



HEAVY METALS

- Arsenic
- Cadmium
- Lead
- Mercury

California Proposition 65
Action levels



HEAVY METALS

Methods:

Acid digestion
ICP/MS

AOAC, FDA, EPA official methods



MYCOTOXINS

Fungal metabolites that can when ingested, inhaled or adsorbed through the skin can cause illness or death in humans or animals.



MYCOTOXINS

Aflatoxins

Ochratoxins

Methods for testing:
LC/MS



RESIDUAL SOLVENTS

Solvents used for processing and extractions

Guide: USP 467

Action levels: USP 467



CANNABINOID PROFILE TERPENES



CANNABINOID PROFILE

ISO 17025 and AOAC First Action Approved potency screen.

- Cannabidiol
- Cannabidiolic acid
- Cannabinol
- Δ -9-tetrahydrocannabinol,
- Tetrahydrocannabinolic acid,
- Cannabichromene
- Cannabidivarinic acid
- Cannabigerol
- Cannabigerolic acid
- Cannabidivarin
- Δ -8-tetrahydrocannabinol
- Tetrahydrocannabivarin



TERPENES

- (-)-alpha-Bisabolol
- Camphene
- 1S)-(+)-3-Carene
- Beta-Caryophyllene
- Cymene, para-
- Eucalyptol
- Alpha-Humulene
- (-)-Isopulegol
- (R)-(+)-Limonene
- Linalool
- beta-Myrcene
- (E)-beta-Ocimene
- (Z)-beta-Ocimene
- Alpha-Pinene
- Beta-Pinene
- Alpha-terpinene
- Gamma-Terpinene
- Terpinolene



UNIQUE FLAVOR AND AROMATIC PROFILE

QUANTIFIED USING GC/MS TECHNOLOGY.



THANK YOU!

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Food Integrity
& Innovation