ADVANCING AUTHENTICITY TESTING IN CERTIFIED ORGANIC PRODUCTS

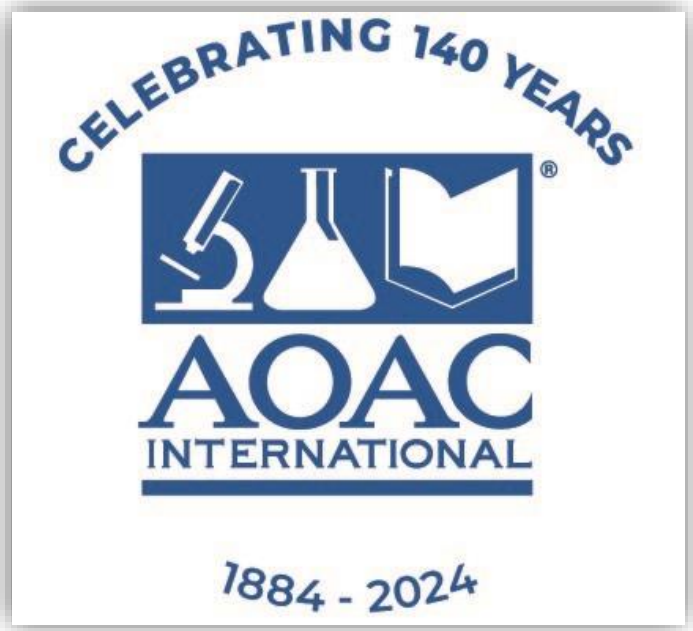
16 JANUARY 2025

WEBINAR AGENDA

- **Welcome and Overview**
  Pam Coleman, AOAC INTERNATIONAL
- **Opening & Speaker Introductions**
  Gwendolyn Wyard, Strengthening Organic Systems (SOS)
- **Advancing Authenticity in Organic Products**
  Speakers
- **Discussion and Q&A**
  Gwendolyn Wyard, Strengthening Organic Systems (SOS)
- **Next Steps and Call to Action**
  Pam Coleman, AOAC INTERNATIONAL

AOAC INTERNATIONAL

In Food & Agriculture, We Set The Standard

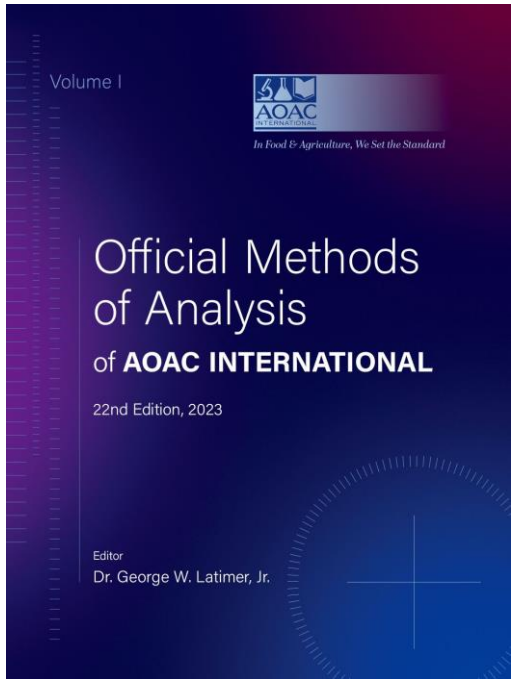


- 1884: The **A**ssociation of **O**fficial **A**gricultural **C**hemists
  - Formed with USDA, later part of FDA, became independent in 1970s
- Who we are: an International Membership Association
- What we do: a global trade facilitator
- How we do it: Academic, Industry & Regulatory collaboration on analytical methods
- 2020: The **A**ssociation of **O**fficial **A**nalytical **C**ollaboration

FILLING ANALYTICAL METHOD GAPS

Need for well-characterized, reliable, reproducible, validated compendial methods that are fit-for-purpose . . . Our Official Methods of Analysis Program

- Analytical target analytes
- Applicable matrices
- Acceptable accuracy or method bias parameters
- Expected method precision results
- Specific terminology



GWENDOLYN WYARD

STRENGTHENING ORGANIC SYSTEMS (SOS)

- Founding Partner, Strengthening Organic Systems (SOS), focusing on organic supply chain integrity and fraud prevention.
- 30+ years in the organic industry, including over 12 years as VP of Regulatory and Technical Affairs for the Organic Trade Association.
- Lead developer of the Organic Fraud Prevention Guide, the industry standard for organic supply chain integrity.
- Early career highlights:
  - Organic inspector and Technical Specialist at Oregon Tilth.
  - Served 12 years on the OMRI Board of Directors.
  - North American representative on the GOTS Advisory Board.
  - Holds an advanced degree in Fermentation Science with a minor in Chemistry.
- Current Board Member of Pennsylvania Certified Organic (PCO).

STRENGTHENING ORGANIC SYSTEMS, LLC

Organic fraud prevention and supply chain integrity

Welcome!

Let’s set the stage for our program today

Gwendolyn Wyard
gwenwyard@organicSOS.com
1 (503) 798 – 3294
OrganicSOS.com

The success of the organic sector relies on consumer TRUST in the USDA organic seal

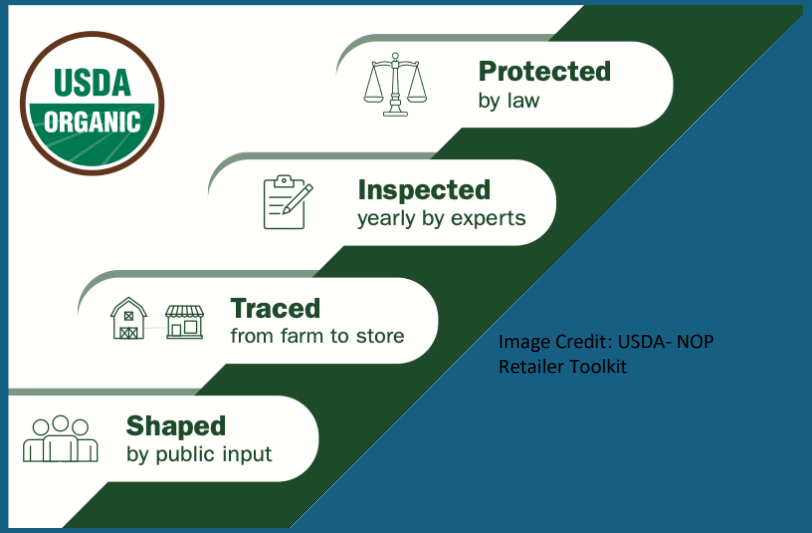
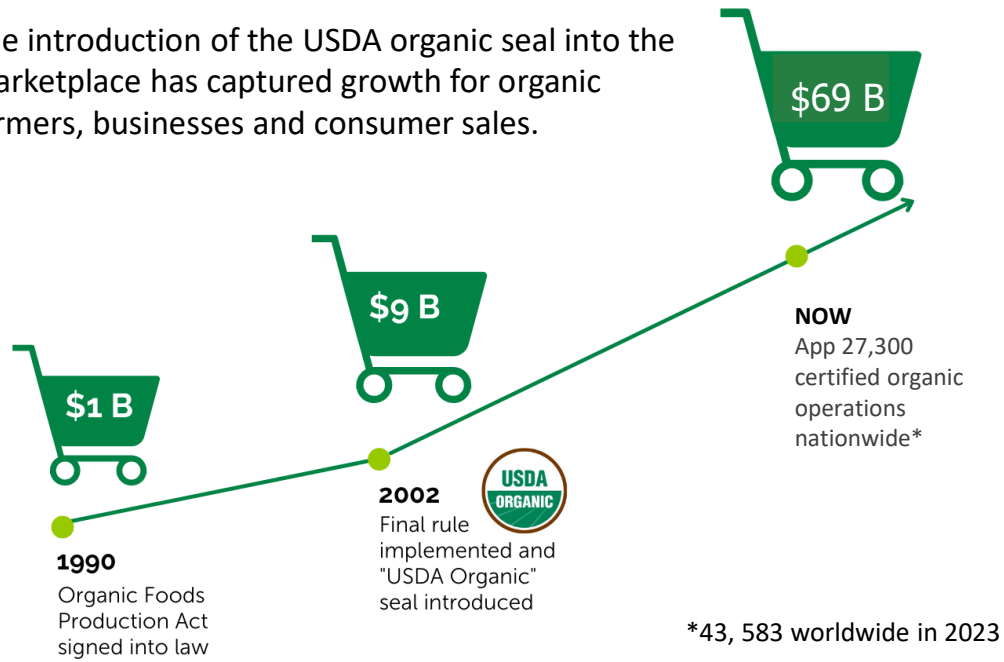


Image Credit: USDA- NOP Retailer Toolkit

- Organic claims are verified through 3rd party certification by USDA accredited certifiers
- Testing is a critical tool for verifying compliance and detecting fraud
- There is a growing concern around the use of prohibited and/or adulterated fertilizer
- Testing improvements are needed to better address the risk and occurrence of fraud

The introduction of the USDA organic seal into the marketplace has captured growth for organic farmers, businesses and consumer sales.



*43, 583 worldwide in 2023

STRENGTHENING ORGANIC SYSTEMS, LLC

Johanna Mirenda, USDA National Organic Program

- Serves as an Organic Regulatory Specialist in the Standards Division of the USDA National Organic Program (NOP).
- Develops policies, guidance, and rules to ensure consistent application of USDA organic regulations.
- 14+ years of nonprofit experience in organic certification, advocacy, research, and education.
- Previous roles:
  - Policy Director, Pennsylvania Certified Organic
  - Farm Policy Director, Organic Trade Association
  - Technical Director, Organic Materials Review Institute
- Holds a B.S. in Horticultural Science and an M.S. in Sustainable Food Systems.

Amy Bruch, Cyclone Farms

- 6th-generation farmer and owner of Cyclone Farms in Nebraska.
- Transformed 2,500+ acres into a cutting-edge organic operation growing corn, soybeans, pulses, grains, and oilseeds.
- Focuses on soil balancing, technology, and innovation for nutrient-dense crops and farm resiliency.
- 20+ years of global agricultural experience, including sustainable farming in South America and Africa.
- Co-founder of AgriSecure: transitioned 70,000+ acres to organic production.
- Former Senior Sy-stems Engineer at General Mills.
- Chair, USDA National Organic Standards Board; named Organic Farmer of the Year (2021) by the Organic Trade Association.

Ehsan Toosi, True Organic Products

- Director of R&D at True Organic Products
- 10+ years in California agriculture, specializing in soil health, nutrient management, and bioprocess innovation.
- Leads research on nutrient recycling and sustainable practices for organic and conventional cropping systems.
- Former Research Scientist at Michigan State University.
- Holds a Ph.D. in Soil Biogeochemistry with a focus on reducing agriculture's environmental footprint by lowering nutrient losses and greenhouse gas emissions.

Eric Jamin, Eurofins Analytics France

- General Manager of the Authenticity Competence Centre at Eurofins Scientific, leading a team of 60 experts in food chemistry, chromatography, authenticity and isotope analysis in Nantes, France.
- Ph.D. in Analytical Chemistry with research on stable isotope analysis of fruit and tobacco.
- 28+ years at Eurofins Scientific, specializing in food authenticity, quality assurance, client support, and R&D.
- Co-author of 50+ scientific publications in food analytical chemistry.

Johanna Mirenda
USDA-NOP

Amy Bruch
Cyclone Farms

Ehsan Toosi
True Organic Products

Eric Jamin
Eurofins Analytics France

Webinar Participants

Enjoy, learn, and *please* ask questions!

USDA Organic Regulations: Strengthening Organic Enforcement & Residue Testing

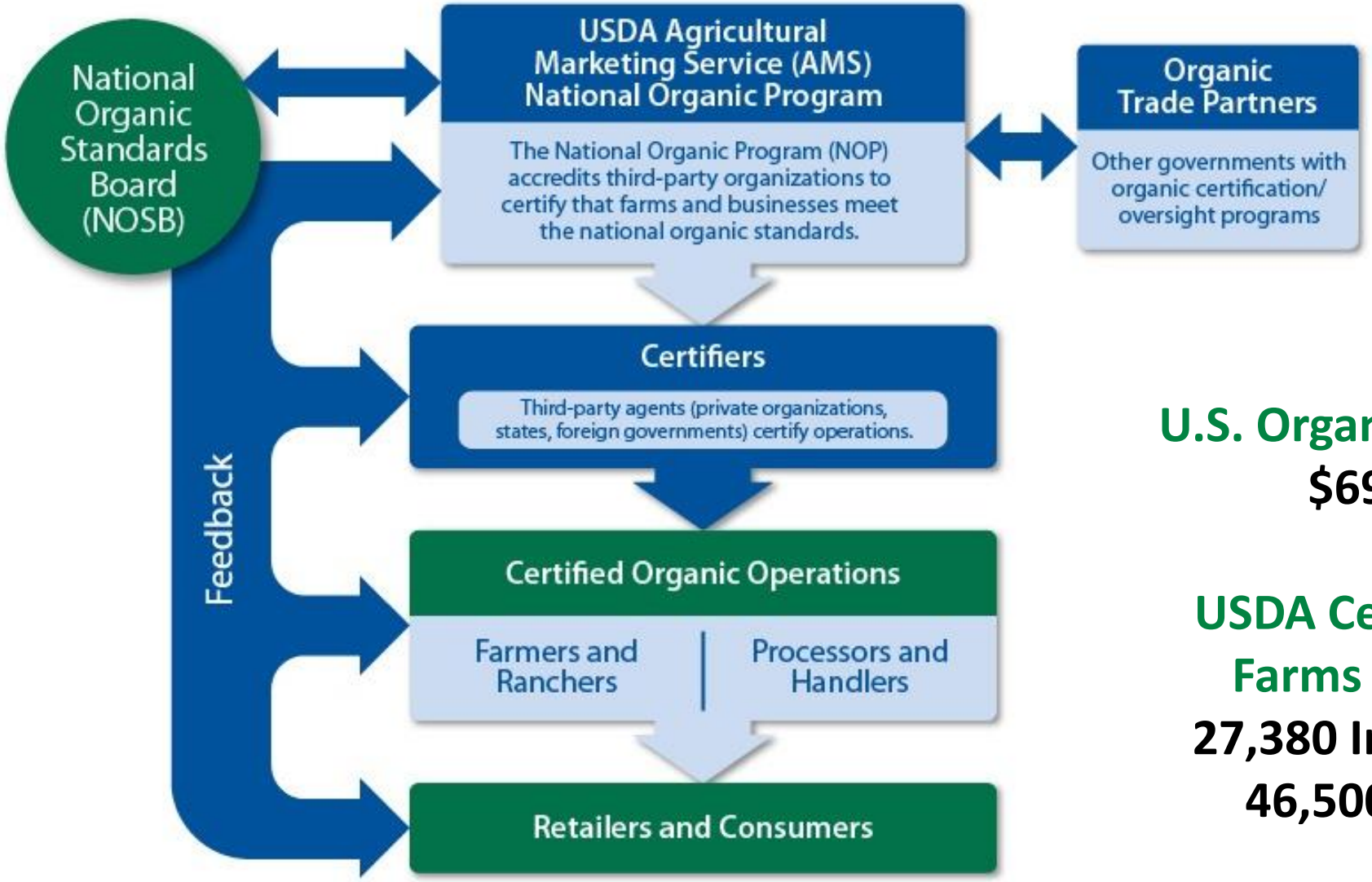
Johanna Mirenda
National Organic Program, Standards Division
January 16, 2025

What the Organic Seal Represents

USDA Oversees the Organic Seal

- Organic production emphasizes natural processes and ingredients
- No genetic engineering allowed
- Supports soil and water quality and biodiversity
- Emphasizes physical, mechanical, and biological farming methods
- Limited number of approved pesticides vetted through Federal Advisory Board
- Rigorous certification process with residue testing and annual inspections

The Organic Public-Private Partnership



U.S. Organic Sales in 2023:
$69.7-billion

USDA Certified Organic Farms and Business
27,380 In United States
46,500 Worldwide

National Organic Program Goal Areas

Grow and develop the organic sector through transition initiatives and technical assistance

Develop and implement organic standards through open, transparent, collaborative processes

Protect organic integrity through strong oversight systems

Protect organic integrity through robust enforcement

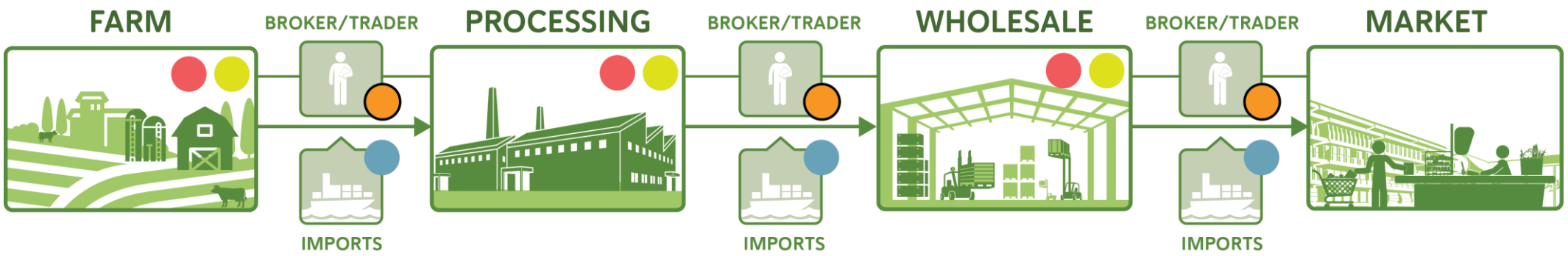
Strengthening Organic Enforcement (SOE) Rule

Effective March 2024, new rules are in place to protect organic integrity and bolster confidence in the organic seal

- **Increase** the number of certified entities to fill gaps
- **Strengthen** recordkeeping and supply chain traceability
- **Require** use of electronic import certificates
- **Strengthen** oversight of accredited certifiers

More SOE Resources → www.ams.usda.gov/rules-regulations/strengthening-organic-enforcement

Applicability of Organic Certification

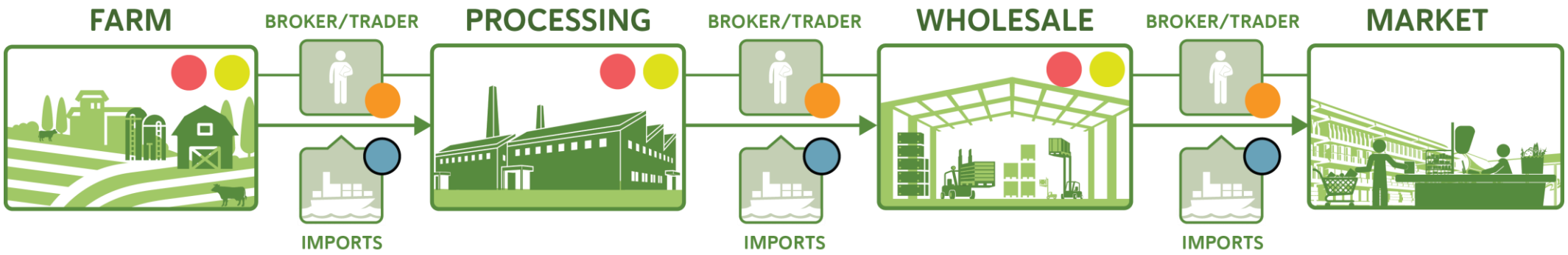


More types of businesses in the organic supply chain must be **certified organic**.

These may include **businesses engaged in buying, selling, or negotiating the sale of organic products,** such as:

- Commodity Brokers
- Traders
- Importers
- Exporters

Imports to the U.S.: Electronic Import Certificates



Certifiers and operations must use the **electronic NOP Import Certificate** for organic products imported to the U.S.

- The Import Certificate **provides traceability** to the port of entry and **ensures an auditable record trail**.
- Certifier of exporter to U.S. generates Import Certificates in NOP's **Organic Integrity Database**
- Importers enter into **CBP import system**.

Deterring Fraud Using Risk-Based Provisions

Organic supply chains have become increasingly complex, leading to **documented cases of organic fraud and oversight gaps**.

Rule implements provisions from the **2018 Farm Bill** and many **National Organic Standards Board** recommendations.

Rule takes a **risk-based approach**: targets higher-risk activities and parts of the supply chain.

Residue Testing

Testing for residues of prohibited substances and/or methods is a critical tool for compliance and enforcement.

NOP Regulations require residue testing

- ✓ **Certifiers must test at least 5% of operations annually**
- ✓ **Investigations and Risk-Based Supply Chain Audits**

NOP Resources on Residue Testing

- **NOP Regulations** (www.ecfr.gov/current/title-7/subtitle-B/chapter-I/subchapter-M/part-205)
  - §§ 205.670-671
- **NOP Handbook** (www.ams.usda.gov/rules-regulations/organic/handbook)
  - Sampling Procedures for Residue Testing
  - Laboratory Selection Criteria for Pesticide Residue Testing
  - Prohibited Pesticides for Residue Testing
  - Responding to Results from Pesticide Residue Testing
  - Memo To Certifiers about Periodic Residue Testing
- **NOP Online Learning Center** (www.ams.usda.gov/services/organic-certification/training)
  - NOP-190 Sampling and Testing

ORGANIC

Protected
by law

Inspected
by experts

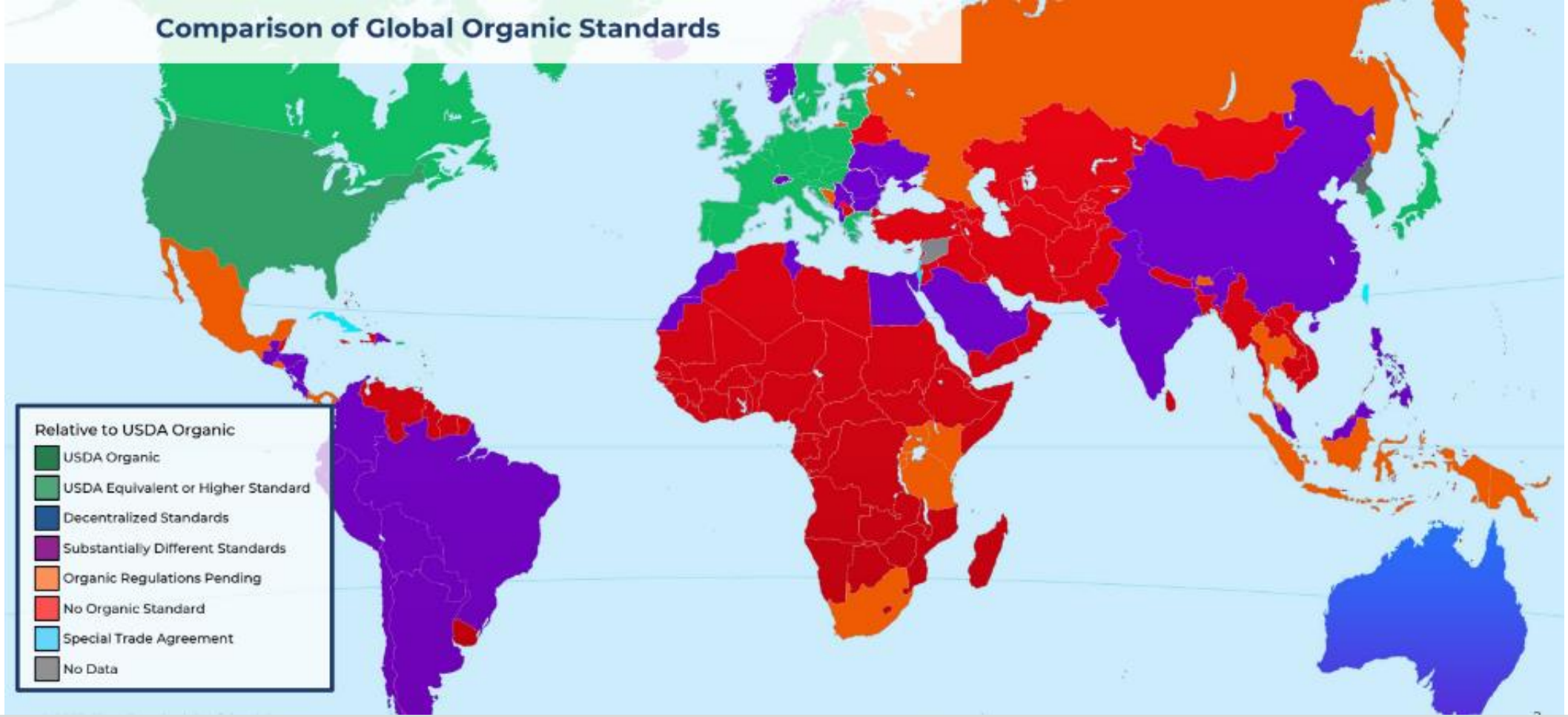
Traced
from farm to store

Shaped
by public input

USDA
ORGANIC

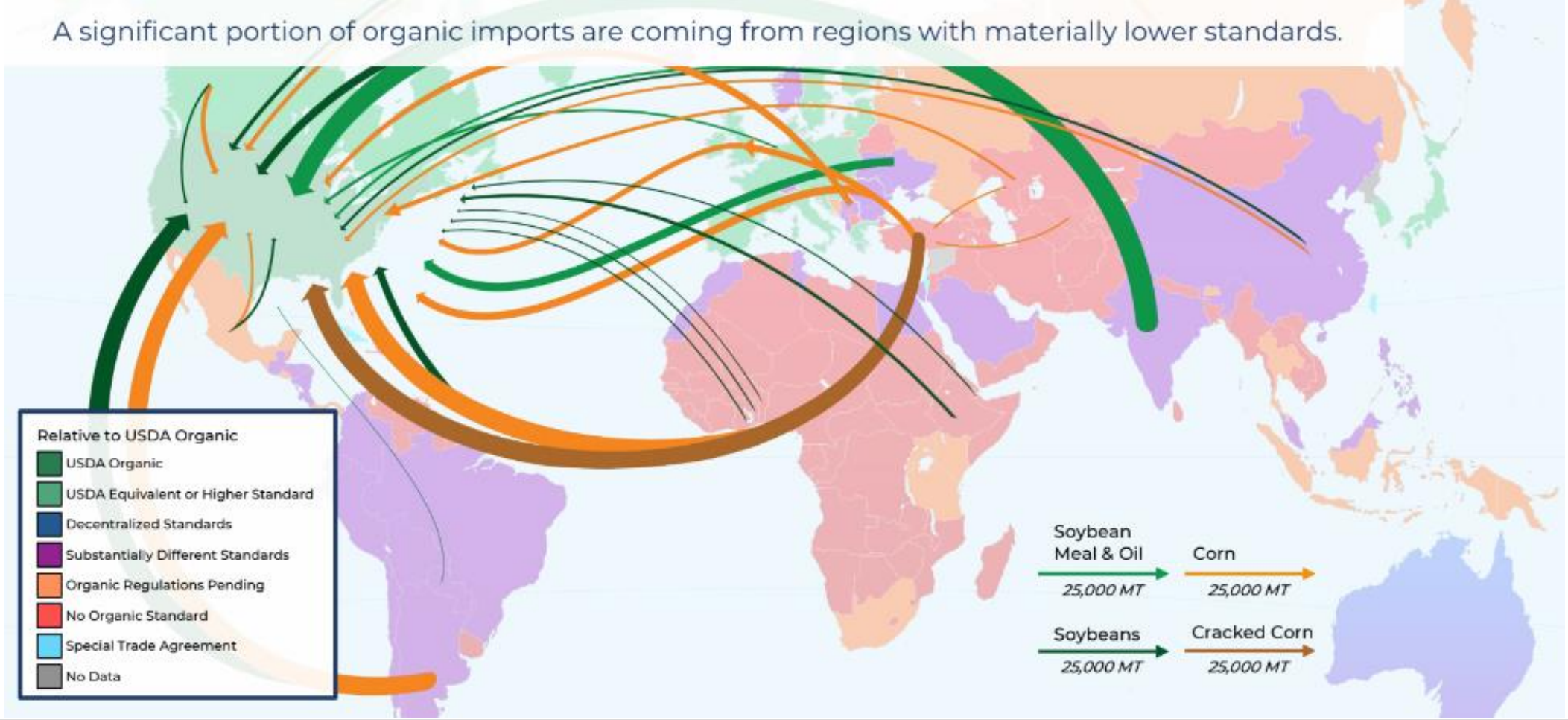
Organic Authenticity:
In the Lens of Two Different Perspectives

Amy Bruch . Cyclone Farms Inc . National Organic Standards Board



Oversight and Enforcement: Continuous Improvement

- **Organic is No Longer a Niche**
- **Trust and Verify!**
  - Phase 1: Strengthening of Organic Enforcement (SOE)
  - Phase 2: Testing



Organic Authenticity: Farmer Perspective

- Protecting Organic Seal is vital for farmers
  - Economic incentive for fraud is high
    - Market Outlook in Grain Production
  - Even Playing Field
- Accountability
  - Hard Evidence to Prosecute
  - Adequate Testing Procedures

7th Generation

Organic Food Grade - White Corn

Why I choose to Grow Organic

- **Continue a Family Legacy**
  - Create a More Resilient Environment for the Next Generation
  - Adapt to Market Demands & Global Market Conditions
  - Rural Stimulus
- **Organic Seal Importance**
  - Legally defined, third-party verified
  - Recognized and Respected
- **Achieve Consistent High Yielding/Nutritious Products**
  - Agronomic Problem Solving vs. Short term Solutions in a Jug
- **Continue Improvement**
  - Network with Producers, Industry, & Other Partners
    - Create Opportunities for others

Organic Authenticity: NOSB Perspective

- Residue Testing for a Global Supply Chain
  - Updating Instruction & Framework
  - Highlighting Additional Vulnerabilities
    - Pesticides
    - Solvents
    - Fumigants
    - Inputs
      - Nitrogen
  - Innovation
    - Novel Forms
      - Ammonia Extract
      - Other forms of Highly Soluble Nitrogen
  - Material Review Assistance
    - Substances of High Solubility

Why focus on Prohibited Synthetic Nitrogen?

- Agronomic Easy Button
  - Circumvents Systematic Approach
    - Agronomics
      - Assists with Monoculture Cropping
      - “Solves” the Fertility Bottleneck
      - Easily Accessible
  - Relatively “Undetectable”
- Market Conditions
  - Bearish Outlook
- Double Whammy
  - Cheaper + Yield Enhancer
- Innovation

Thank You for Your Time Today

- Farming and Agri-business is my Life & Passion
- Organic Agriculture Grows Resiliency in America's Rural Areas
- Please Assist!
  - Continuous Improvement for Authenticity Verification

CYCLONE
Farms Inc.

Time to Talk About Organic Integrity Too, Perspective From the Industry

Ehsan Toosi, PhD

Director of R&D

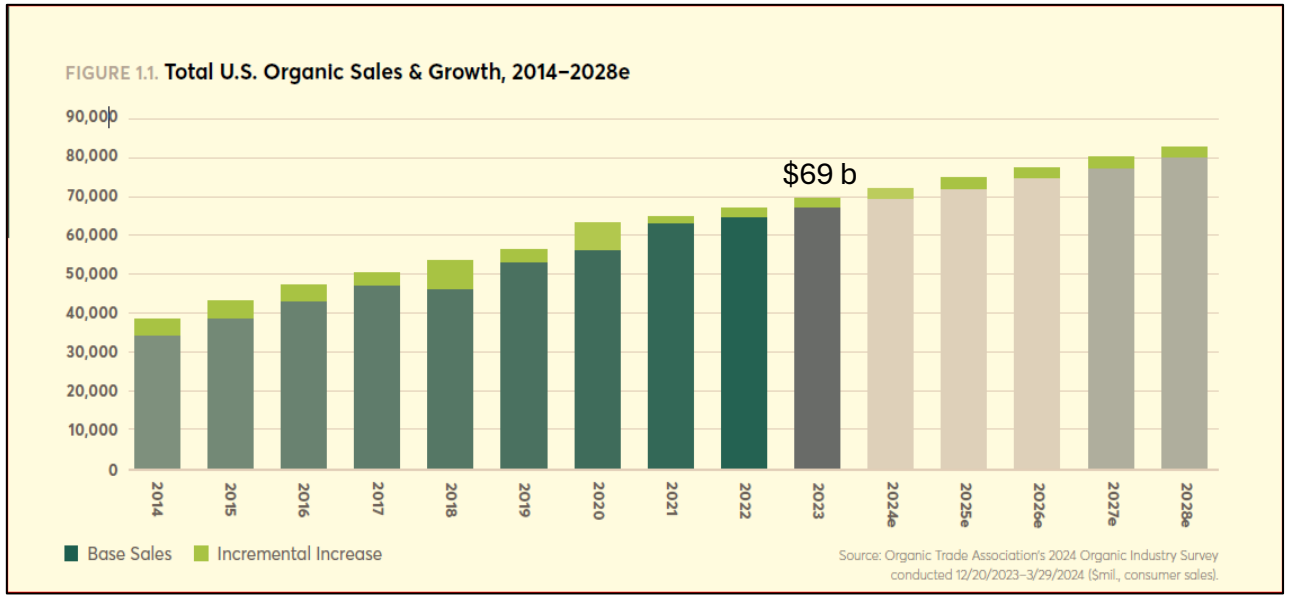
True Organic Products

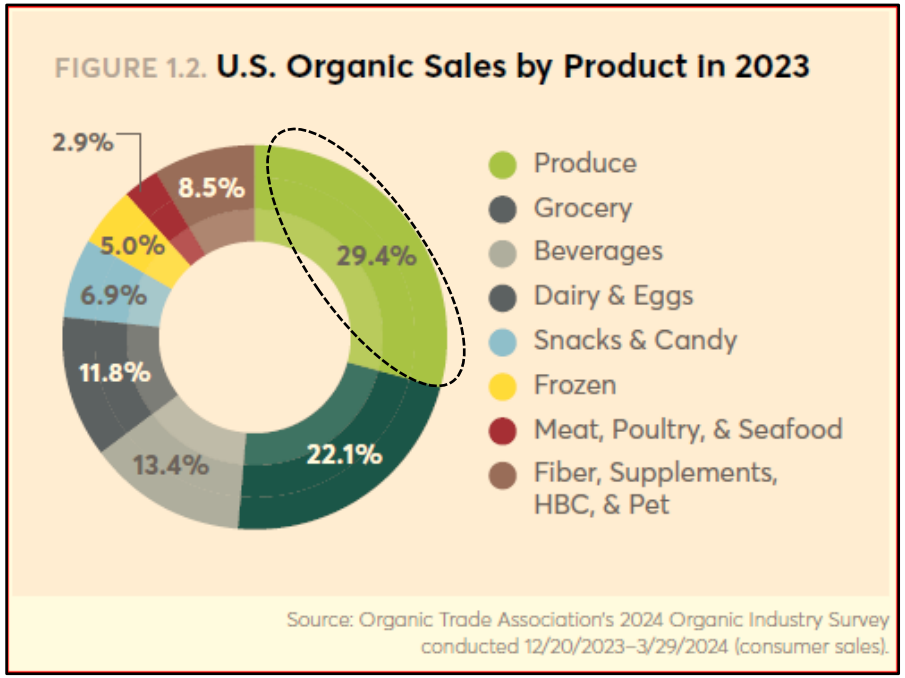
Outlines

- The organic market and relevance of fraud
- Case studies, fertilizer and fresh produce
- Challenges and gaps

Organic market has been expanding and is predicted to grow

For the organic sector to continue growing, Economically Motivated Fraud must be addressed





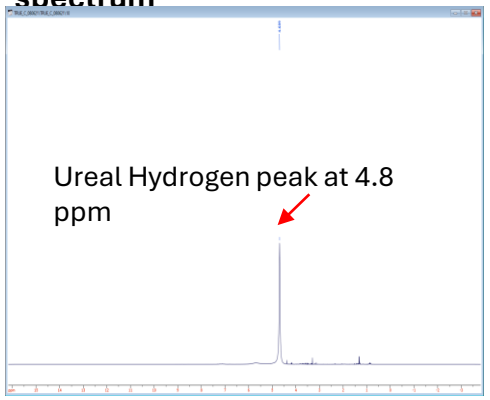
Examples of “suspicious” N fertilizer

Meeting high N concentrations in organic fertilizers is a challenge

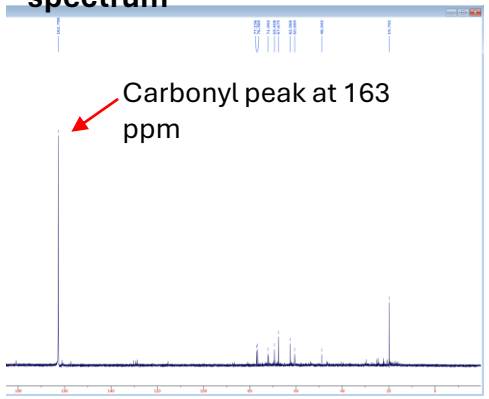
Example I

A liquid fertilizer claiming 13% N appeared to contain 4% Urea, and its $\delta^{15}N < -1‰$!!!

^{1}H-NMR spectrum



^{13}C-NMR spectrum



Collaboration with UC Santa Barbara

Example II

A plant-based N fertilizer was comprised of just ammonium and nitrate!

[redacted]

REPORT DATE May 24, 2023
RECEIVED DATE May 19, 2023
SEND TO 40616

Midwest Laboratories®
13611 B Street • Omaha, Nebraska 68144-3693 • (402) 334-7770
www.midwestlabs.com

PAGE 1/1
ISSUE DATE May 24, 2023

TRUE ORGANIC PRODUCTS
MICHAEL MENES
20225 W KAMM AVE
HELM CA 93627

REPORT OF ANALYSIS
For: (40616) TRUE ORGANIC PRODUCTS
RD26

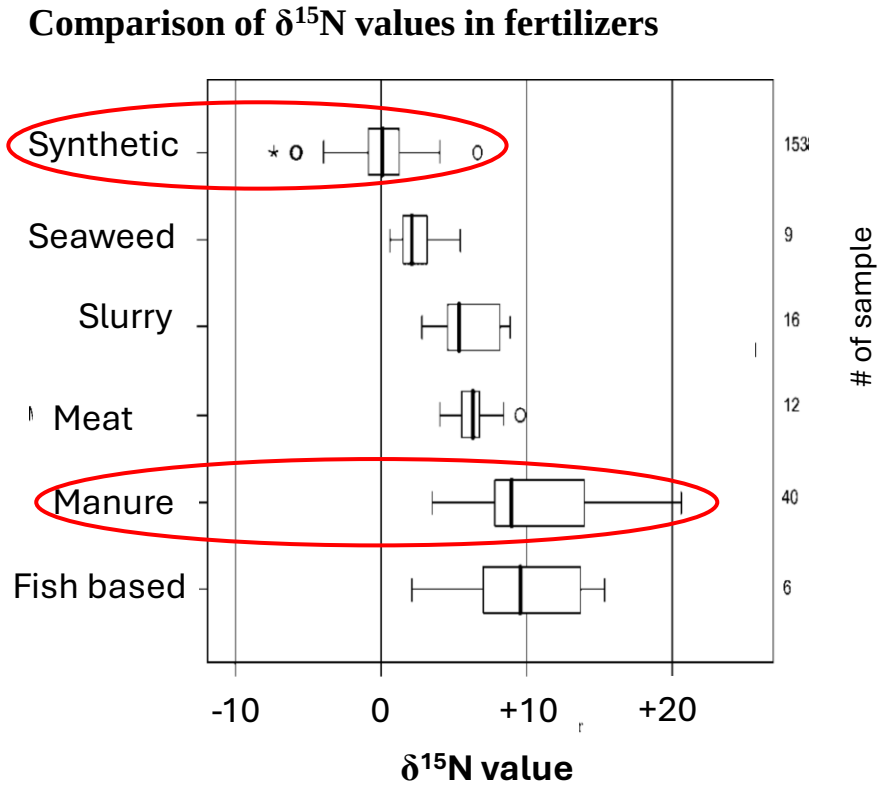
Analysis	Level Found As Received	Units	Reporting Limit	Method	Analyst-Date	Verified-Date
Sample ID: 26.23.001 Lab Number: 70289964						
Nitrogen (total)	9.92	%	0.01	WC 055	mdh0-2023/05/24	eas2-2023/05/24
Nitrate-nitrogen	5.06	%	0.01	WC PROC 32	Rpk5-2023/05/22	eas2-2023/05/24
Ammonium nitrogen (total)	4.86	%	0.01	AOAC 920.03 (mod)	krg0-2023/05/22	eas2-2023/05/24
Urea nitrogen (N)	< 0.1	%	0.1	AOAC 941.04 (mod.)	krg0-2023/05/22	eas2-2023/05/24

All results are reported on an AS RECEIVED basis

For questions please contact:

N Isotope technique, a powerful tracing tool for differentiating cropping systems

Organic (bio-based) fertilizers and crops have much higher $\delta^{15}N$ than synthetic fertilizers and conventionally grown crops. Few exceptions exists.

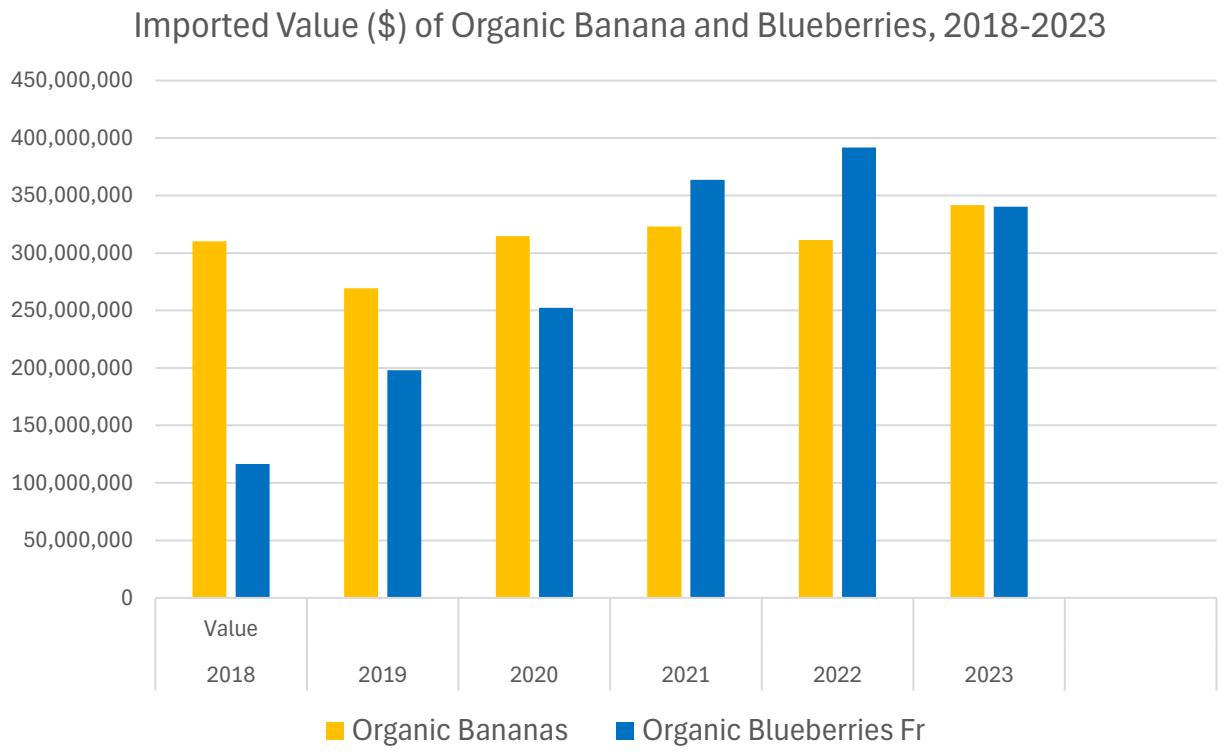


- Whiskers indicate max and min values
- Bold lines across the boxes indicate median values
- Boxes indicate 75% of data range for the given sample

Ref.: Isotopes in Environ & Health Studies, 2007, 43: 237–247

Fresh Produce case studies:

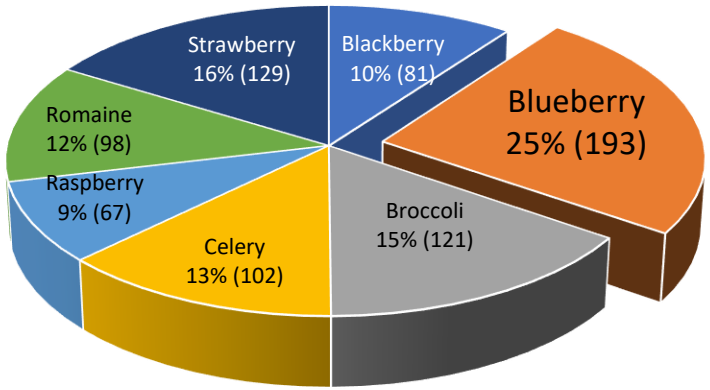
Organic banana and blueberries are among top 5 imported organic ag commodities to the US



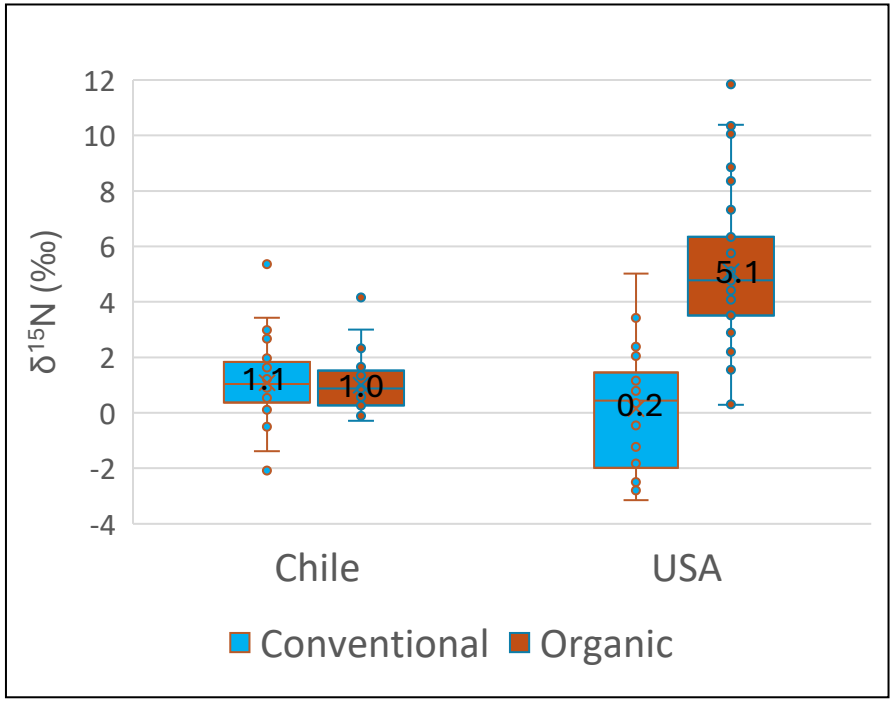
Case study I, Fresh Produce

- 791 fresh produce samples were collected
- Crops grown in the US and other countries
- Collaboration with UC Davis

Distribution of collected fresh produce



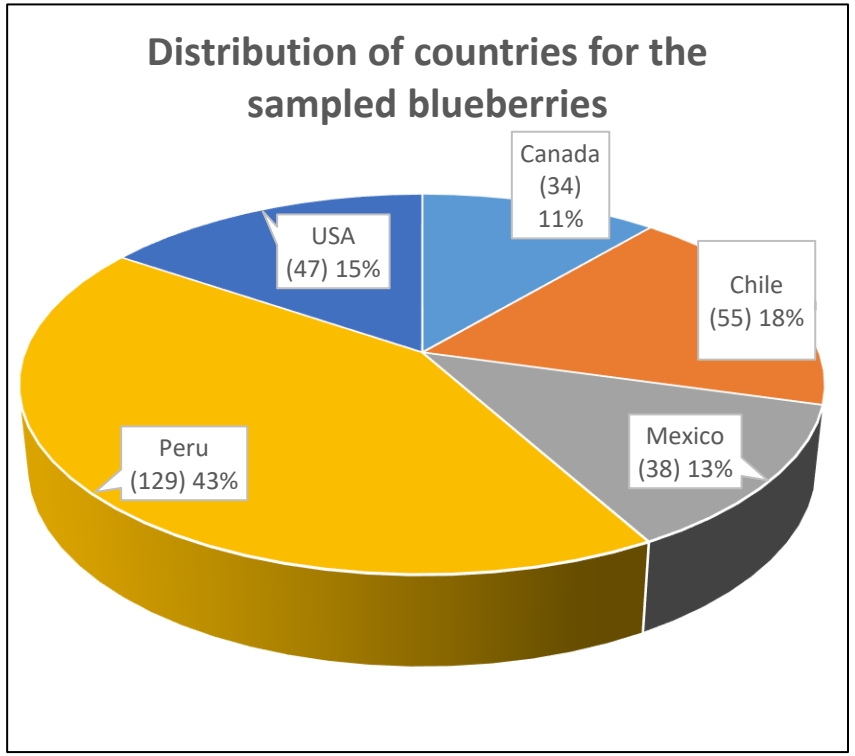
$\delta^{15}N$ values of Conventional and Organic blueberry

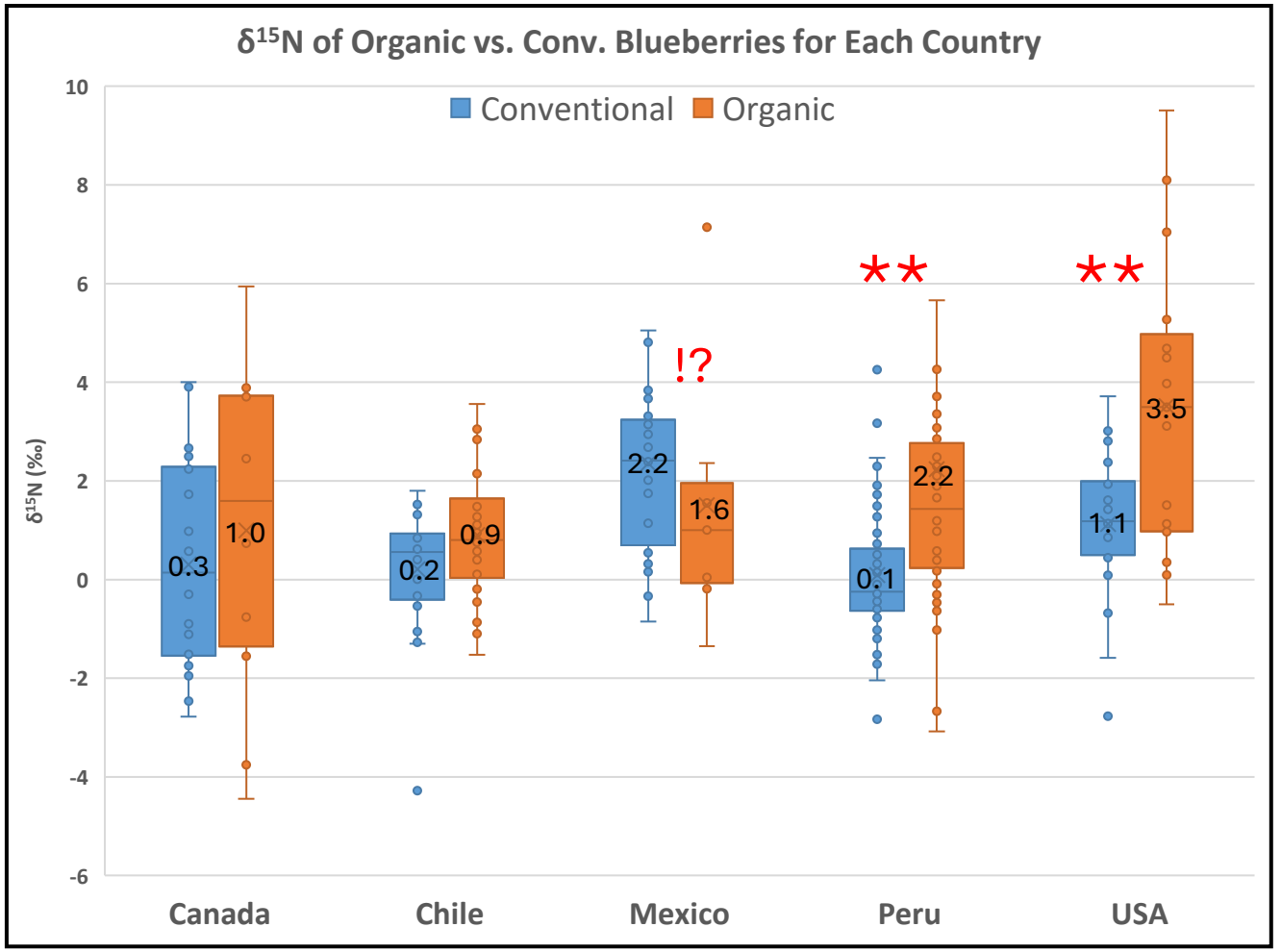


Case Study II, Blueberries

Organic blueberries grown in the US showed strongest evidence of N authenticity

- Collected 303 blueberry packages from WA, OR, CA, AZ
- Collaboration of UC Davis-True Organic

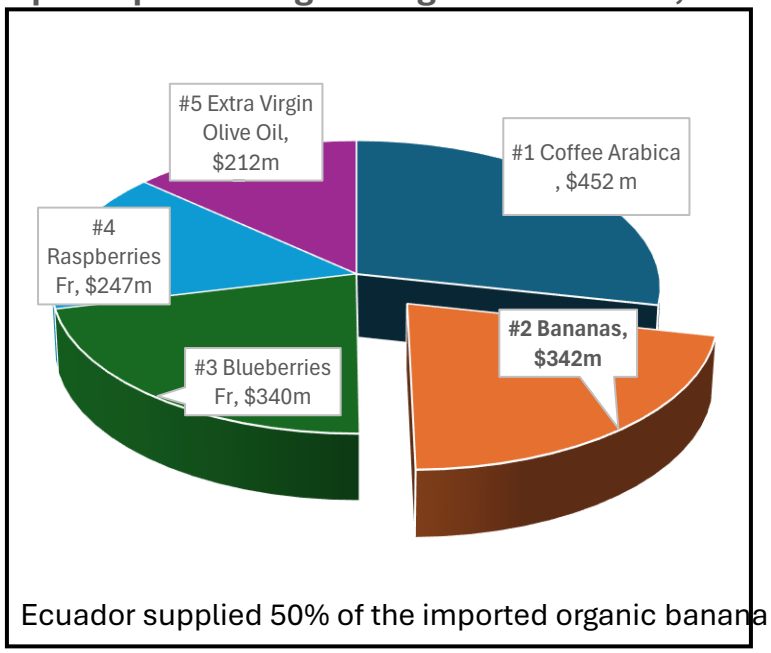




Different approach: “What does it Take to Grow Organic?”

Example, Organic Banana imported from Ecuador

Top 5 Imported Organic Ag Commodities, 2023



Ecuador supplied 50% of the imported organic banana

1	2	3	4	5	6
Imported Organic Banana from Ecuador to the US, 2023	Banana N requirement	Organic N fertilizer scenarios	Organic N fertilizer, req. to grow exported organic banana to the US, 2023	**Organic N fertilizer, req. to grow exported organic banana to both EU and US, 2023**	Logistics
ton	Kg/ha		ton	**ton**	20 t truck
305,206	250	organic fertilizer, 6%N	54,000	**108,000**	5,383
		Composted manure, 3.5%N	92,000	**184,000**	9,228
		Greenwaste compost, 1%N	323,000	**646,000**	32,297

Assumption:
Cavendish Banana yield: 45 t/ha
Organic Yield factor: 0.7
Export Quality factor: 0.75

Ref:
Jimenez et al., 2017
Dawson & Vaal, 2023
USDA (https://apps.fas.usda.gov/gats/default.aspx)
FAO https://www.fao.org/markets-and-trade/commodities-overview/bananas-tropical-fruits/bananas/en

“What does it Take to Grow Organic?”, Nutrient Availability

Rapid growth of organic exports from developing countries to be seen from the technical, and resource availability lenses

- Availability of “organic” nitrogen is a major constraints in expansion of organic

nature food

ARTICLES

https://doi.org/10.1038/s43016-021-00276-y

Check for updates

Global option space for organic agriculture is delimited by nitrogen availability

Pietro Barbieri[1,2], Sylvain Pellerin[1], Verena Seufert[3], Laurence Smith[4], Navin Ramankutty[5] and Thomas Nesme[1,2]

Nutr Cycl Agroecosyst

https://doi.org/10.1007/s10705-023-10297-7

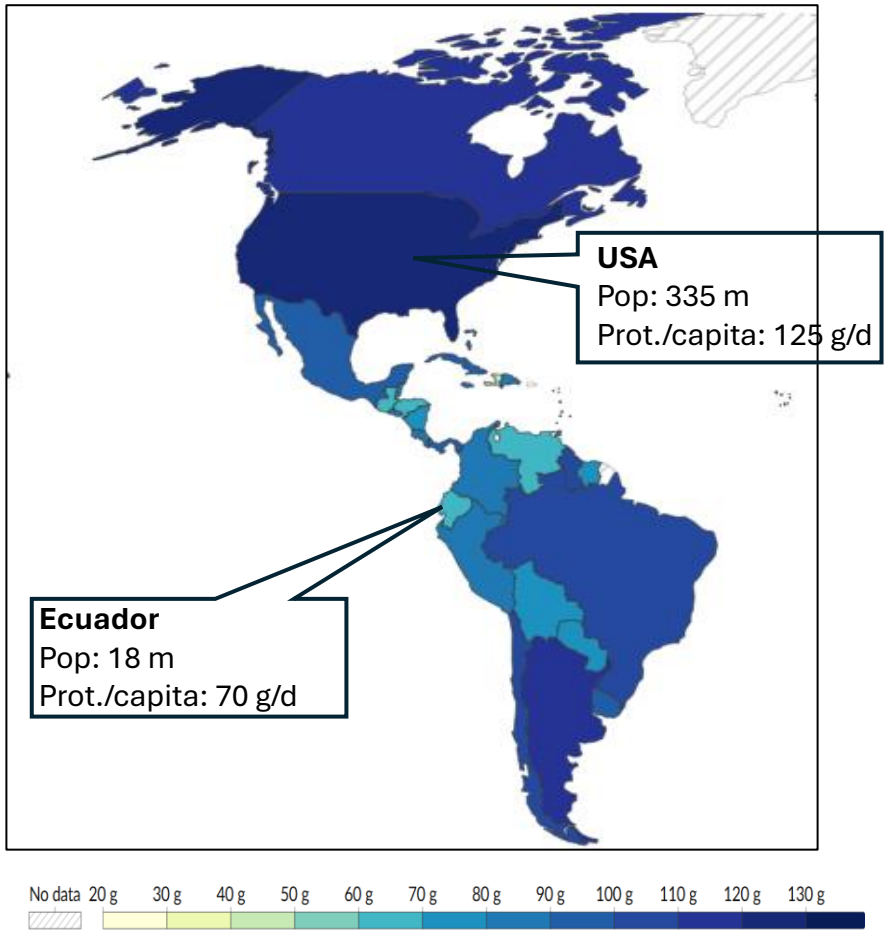
ORIGINAL ARTICLE

Check for updates

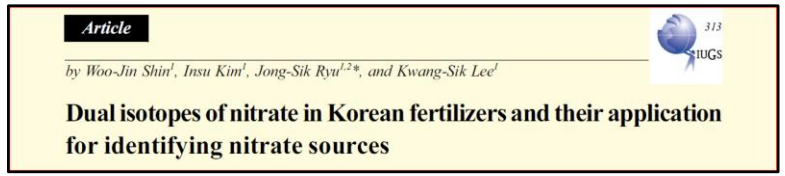
Sustainable growth of organic farming in the EU requires a rethink of nutrient supply

Marie Reimer · Myles Oelofse · Dorette Müller-Stöver · Kurt Möller · Else K. Bünemann · Silvia Bianchi · Airi Vetemaa · Dóra Drexler · Bence Trugly · Ben Raskin · Hugh Blogg · Anton Rasmussen · Vincenzo Verrastro · Jakob Magid

Daily per capita protein supply (gr/day), 2021 (FAO)

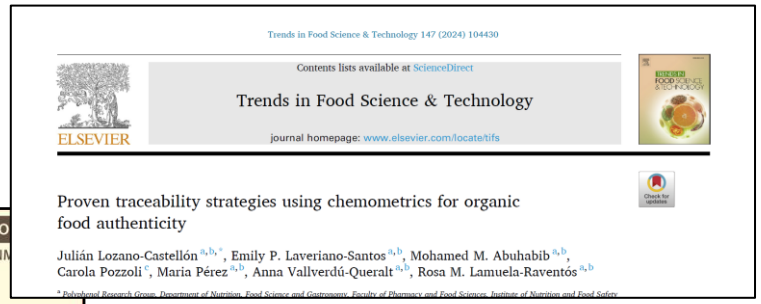


Analytical tools are available, method development is in progress, standardization is lacking


Article

by Woo-Jin Shin[1], Insu Kim[1], Jong-Sik Ryu[1,2]*, and Kwang-Sik Lee[1]

Dual isotopes of nitrate in Korean fertilizers and their application for identifying nitrate sources


Trends in Food Science & Technology 147 (2024) 104430

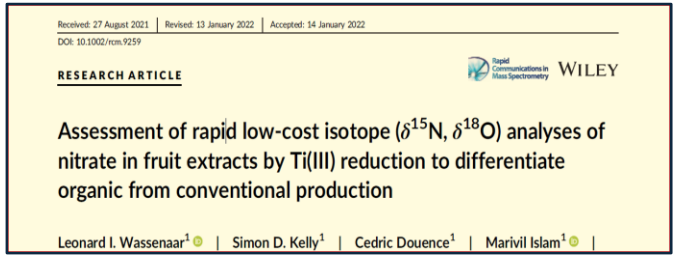
Contents lists available at ScienceDirect

Trends in Food Science & Technology

journal homepage: www.elsevier.com/locate/tifs

Proven traceability strategies using chemometrics for organic food authenticity

Julián Lozano-Castellón [a,b,*], Emily P. Laveriano-Santos [a,b], Mohamed M. Abuhabib [a,b], Carola Pozzoli [c], María Pérez [a,b], Anna Vallverdú-Queralt [a,b], Rosa M. Lamuela-Raventós [a,b]


Received: 27 August 2021 | Revised: 13 January 2022 | Accepted: 14 January 2022

DOI: 10.1002/rcm.9259

RESEARCH ARTICLE

Rapid Communications in Mass Spectrometry WILEY

Assessment of rapid low-cost isotope ($\delta^{15}N$, $\delta^{18}O$) analyses of nitrate in fruit extracts by Ti(III) reduction to differentiate organic from conventional production

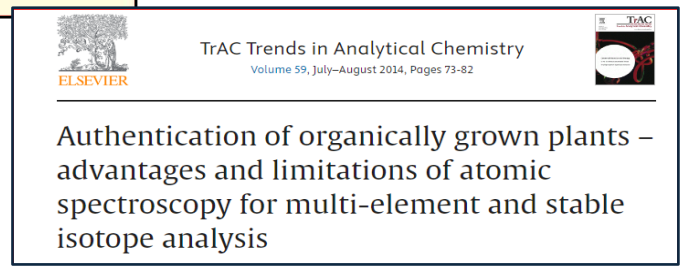
Leonard I. Wassenaar[1] | Simon D. Kelly[1] | Cedric Douence[1] | Marivil Islam[1] |

Journal of Environmental Quality TECHNICAL REPO

ORGANIC COMPOUNDS IN THE ENVIRONM

Nitrogen, Sulfur, and Oxygen Isotope Ratios of Animal- and Plant-Based Organic Fertilizers Used in South Korea

Woo-Jin Shin,* Jong-Sik Ryu, Bernhard Mayer, Kwang-Sik Lee, and Insu Kim


TrAC Trends in Analytical Chemistry

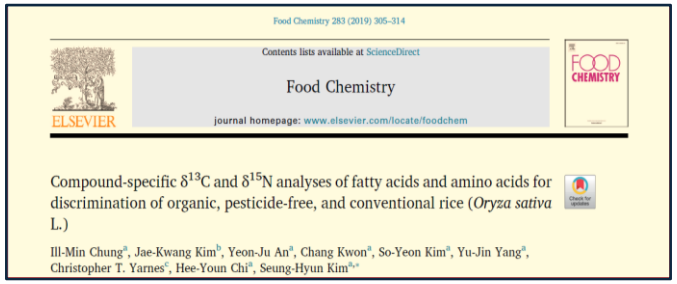
Volume 59, July–August 2014, Pages 73-82

Authentication of organically grown plants – advantages and limitations of atomic spectroscopy for multi-element and stable isotope analysis


RESEARCH ARTICLE

Testing protocol ensures the authenticity of organic fertilizers

by Fungai N.D. Mukome, Timothy A. Doane, Lucas C.R. Silva, Sanjai J. Parikh and William R. Horwath


Food Chemistry 283 (2019) 305–314

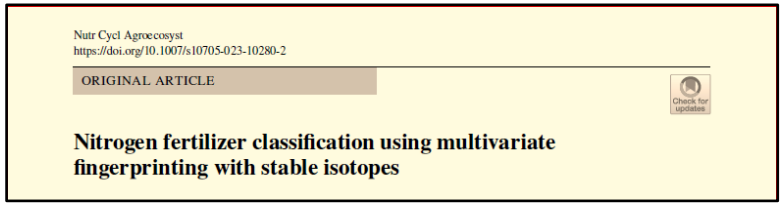
Contents lists available at ScienceDirect

Food Chemistry

journal homepage: www.elsevier.com/locate/foodchem

Compound-specific $\delta^{13}C$ and $\delta^{15}N$ analyses of fatty acids and amino acids for discrimination of organic, pesticide-free, and conventional rice (*Oryza sativa* L.)

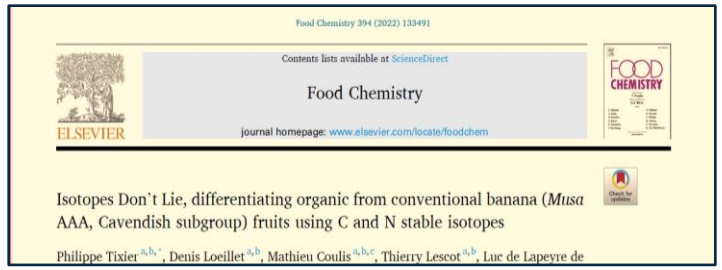
Ill-Min Chung[a], Jae-Kwang Kim[b], Yeon-Ju An[a], Chang Kwon[a], So-Yeon Kim[a], Yu-Jin Yang[a], Christopher T. Yarnes[c], Hee-Youn Chi[a], Seung-Hyun Kim[a,*]


Nutr Cycl Agroecosyst

https://doi.org/10.1007/s10705-023-10280-2

ORIGINAL ARTICLE

Nitrogen fertilizer classification using multivariate fingerprinting with stable isotopes


Food Chemistry 394 (2022) 133491

Contents lists available at ScienceDirect

Food Chemistry

journal homepage: www.elsevier.com/locate/foodchem

Isotopes Don't Lie, differentiating organic from conventional banana (*Musa* AAA, Cavendish subgroup) fruits using C and N stable isotopes

Philippe Tixier [a,b,*], Denis Loeillet [a,b], Mathieu Coulis [a,b,c], Thierry Lescot [a,b], Luc de Lapeyre de

Come and join us in our effort to safeguard organic

Challenges and gaps:

- Bringing funding agencies onboard
- Determining threshold of violation for key imported crops
- Combining tracing techniques to add confidence
- Pair pesticide residue and nutrient testing
- Collaborate with Food Forensics community
- Processed food and foods containing multiple ingredients
- Availability of commercial analytical services,
- Developing methodology for nutrients other than N
- Special cases, e.g., N-capturing from digesters.

Acknowledgement

Dr. Will Horwath, UC Davis

Dr. Xia Zhu-Barker, U of Wisconsin

Stable Isotope Lab, UC Davis

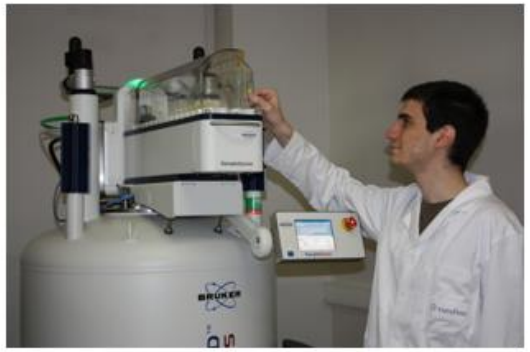
AOAC International

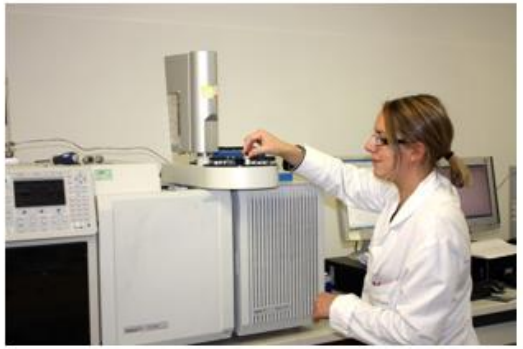
Overview of organic status testing in EU & current applications

Eric Jamin, PhD
Eurofins Authenticity Competence Center,
Nantes (France)

Authenticity testing pioneers since 1987

Nantes, France
60 staff members
1500 m2





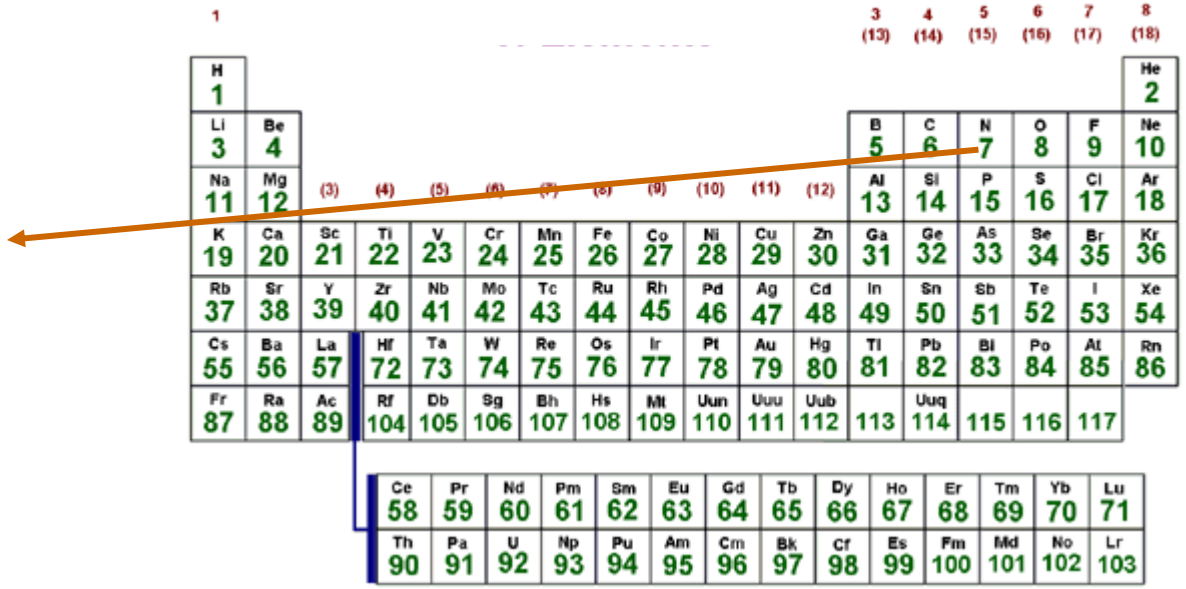
Eurofins Authenticity Competence Center: Our credentials

- ISO 17025 acreditation of the laboratory (since 1994), flexible accreditation
- Member of the CEN Technical Committee 460 on food authenticity
- President of the AFNOR V03A commission on food authenticity
- Regular Proficiency Testing organiser for stable isotope testing of food (FIT-PTS), profiling NMR (PRO-PTS) and fruit juice authenticity testing (JUICE-PTS)
- >30 years of experience in organising and exploiting collaborative studies, including AOAC ones (resulting in official methods 995.17, 2000.19, 2004.01, 2006.05)
- Member of permanent technical working groups at OIV, AIJN, IFU, SGF, EU (international industry organisations)
- Coordination and participation in many collaborative research projects aiming at improving authenticity testing

Fertilizers origin control:
Use of Nitrogen isotopic deviation $\delta^{15}N$

Isotopic Ratio

$$\frac{{}^{15}_{7}N}{{}^{14}_{7}N}$$



Isotopic Deviation

$$\delta^{15}N\ sample\ (‰) = ({}^{15}N/{}^{14}N sample\ /\ {}^{15}N/{}^{14}N atm\ -1) * 1000$$

Atm = Nitrogen in the Atmosphere, taken as reference ($\delta^{15}N air = 0$ ‰)

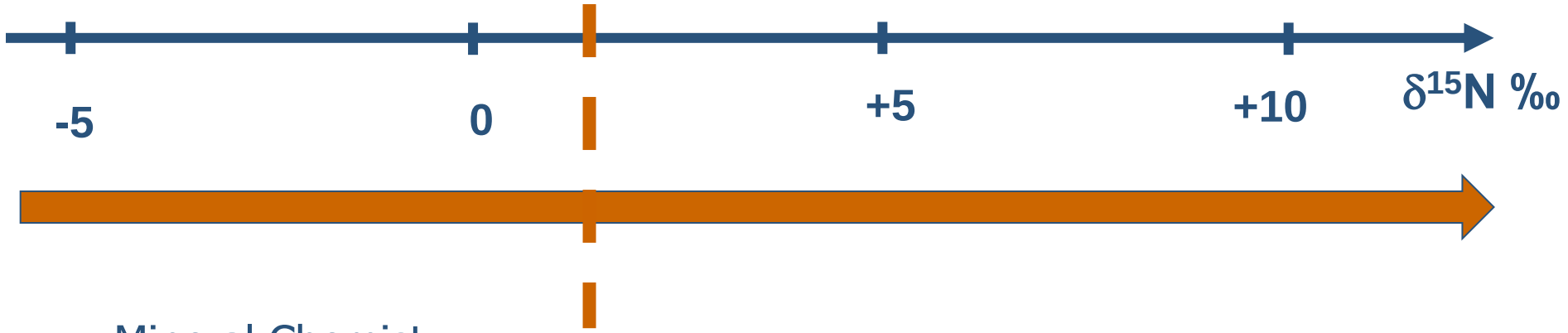
Fertilizers origin control:
Use of Nitrogen isotopic deviation $\delta^{15}N$

Analysis technique:
IRMS = Isotopic Ratio Mass Spectrometry

- Combustion in an elemental analyser
- Separation of isotopic forms in a Mass Spectrometer

➢ Precise isotopic ratio measurement

Fertilizers origin control:
Use of Nitrogen isotopic deviation $\delta^{15}N$



Prohibited for organic agriculture

Authorised for organic agriculture

Is Nitrogen isotopic deviation $\delta^{15}N$ sufficient / applicable in all cases?

- **The answer is no:**
  - **Plants fixing atmospheric nitrogen, such as soy, have ^{15}N deviations close to 0‰**
  - **The isotopic values of nitrogen in plants are also influenced by nitrogen intake from the soil and metabolic effects, resulting in a wider range of possible values**

- **Still Nitrogen 15 is a valuable tracer, which should be used in combination with:**

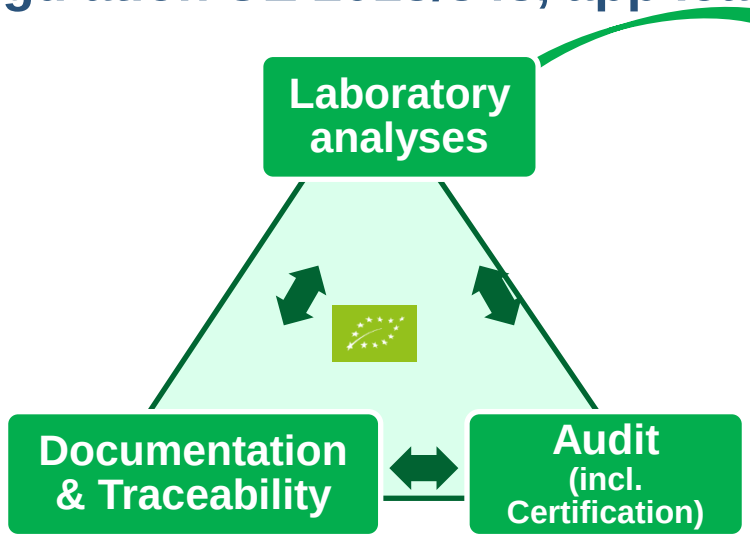
  - Traceability audits

  - Other analyses

  - Other stable isotopes (e.g. C13, O18) can provide complementary information

EU Organic regulation and existing control

The EU has established a control process based on organic agriculture regulations (Regulation UE 2018/848, applicable since 1/1/2022)



- Current analytical controls are mainly based on **pesticide identification and GMO detection.**
- **Limits of the current approach:**
  - **Non-specific markers** of the organic features
  - **Targeted analyses**:
    - We find what we are looking for
    - We can only look for a limited number of substances
  - **Partial markers – neglecting most of the organic agriculture specifications**
    - Use of robust varieties
    - Crops rotation
    - Organic matter recycling
    - Animal well-being
    - Treatments based on soft medicines
    - …

A French collaborative research project: TOFoo (2020-2025)

Sponsor bpifrance FRANCE 2030

Coordinator eurofins

TOFoo
True Organic Food

atol Conseils & Développements

UniLaSalle Terre & Sciences

itab l'Institut de l'agriculture et de l'alimentation biologiques

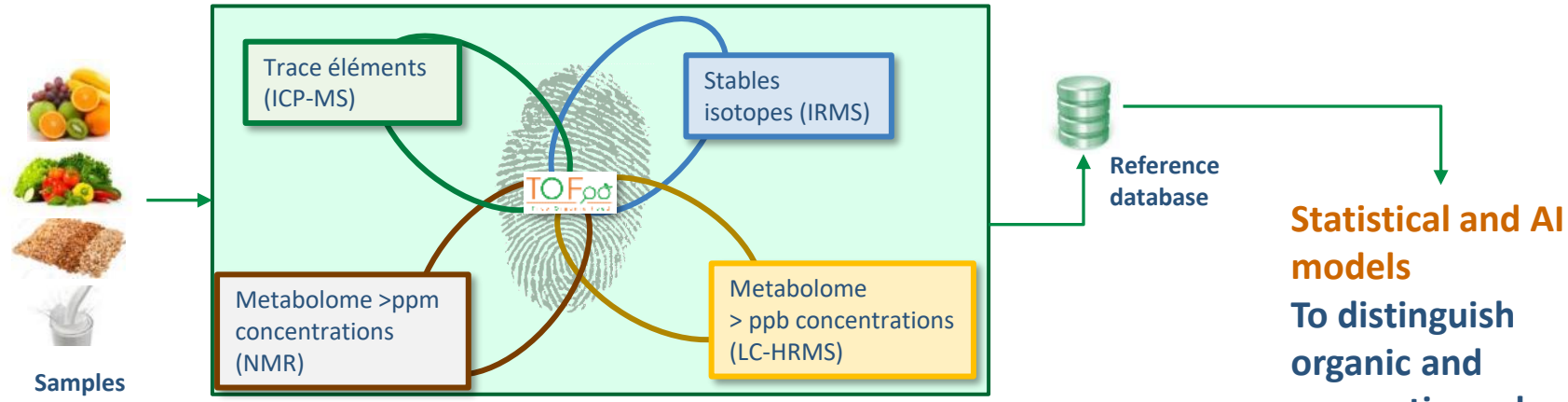
Bonduelle
La nature, notre futur

GEPEA UMR CNRS 6144

ThermoFisher SCIENTIFIC

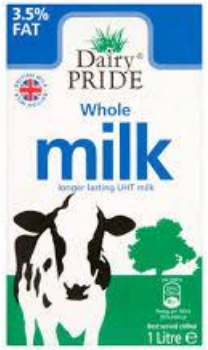
CEISAM Chimie et Interdisciplinarité Synthèse, Analyse, Modélisation

Non-targeted analyses



- Databases containing **hundreds of reference samples** (50% organic – all over France).
- **Two analytical techniques** chosen for each food product to get robust results.
- **Choices of models depending on the classification performance** – using independent sets of samples.

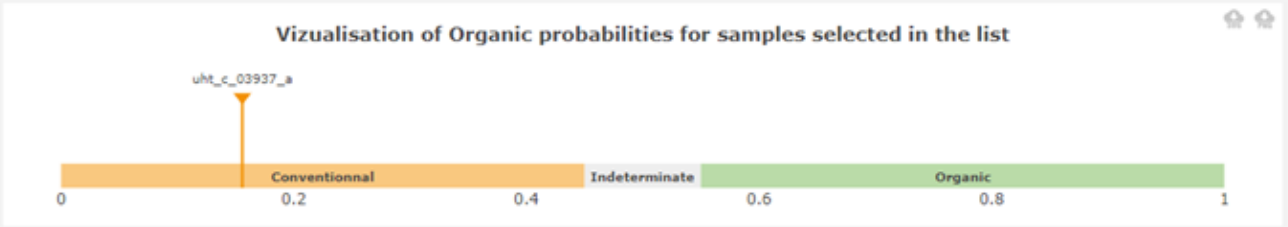
More than 4000 samples collected over 4 years



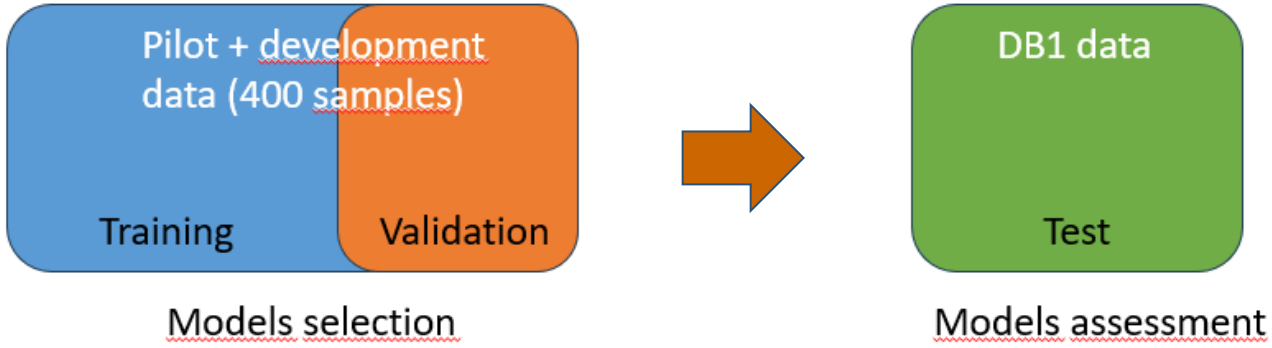
Results - example

Application of the models developed in TOFoo® to unknown samples

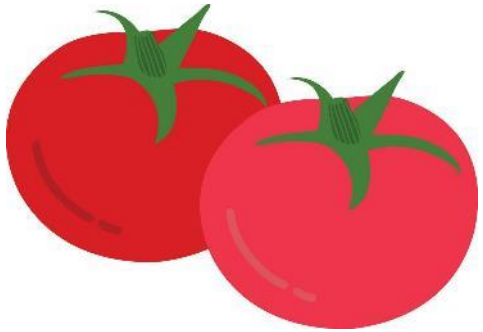
Order	Sample	Theoretical B/C	P(Organic)	Calculated B/C	
112	uht_c_03935_a	c	0.018	c	✓
113	uht_c_03936_a	c	0.01	c	✓
114	uht_c_03937_a	c	0.156	c	✓
115	uht_c_03938_a	c	0.435	c	✓
116	uht_c_03939_a	c	0.026	c	✓
117	uht_b_03940_a	b	0.977	b	✓
118	uht_b_03941_a	b	0.999	b	✓
119	uht_b_03942_a	b	0.98	b	✓
120	uht_b_03943_a	b	0.993	b	✓
121	uht_b_03944_a	b	0.989	b	✓
122	uht_b_03945_a	b	0.755	b	✓
123	uht_c_03946_a	c	0.075	c	✓



Performance assesment



3 validated models so far, with correct classification rate >95%:

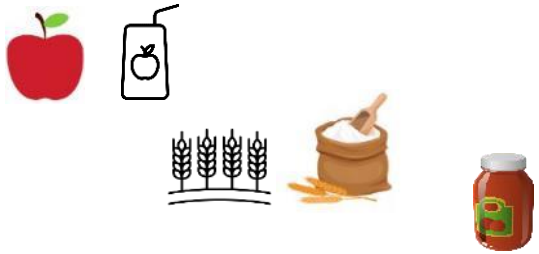


Extension of models to EU origins has also been confirmed

Next steps

Planned releases (2025 – end of projects):

- Q1: **Processed apple** (purée, juice)
- Q2: **Wheat** (grains and flour)
- Q3: **Processed Tomatoes** (purée, paste)



- **Scientific articles will be submitted for publication**
- **Methods & data analysis tool shall become commercially available**
- **Other organic products:**
  - ➢ **Would require a suitable database extension (sampling reference samples)**

- **Other organic products:**
  - **Would require a suitable database**

Follow the TOFoo project

Discover our website: www.tofoo-project.com

- **Subscribe to our newsletter !**

Linkedin page: https://www.linkedin.com/company/eurofins-alimentaire-france/mycompany/

Preliminary comments

- **There is to date no official analytical method for ^{15}N measurement for fertilisers or fruits / vegetables**
  - A CEN method is just published for food&feed products (EN 18054)
  - Organising a collaborative study for fertilisers should be an easy task

- **Authenticity testing of organic products also requires suitable databases**
  - Should this be included in AOAC coordinated work or not?

- **Other analytical approaches such as metabolomics (NMR, MS)**
  - A need for the future?

Thank you, Speakers!

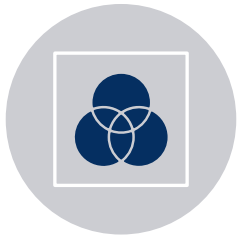
Discussion
Q&A

Please put your questions and comments into the chat.

WHAT ARE SMPR™

DOCUMENTS A COMMUNITY'S ANALYTICAL METHOD NEEDS

VERY DETAILED DESCRIPTION OF THE ANALYTICAL REQUIREMENTS



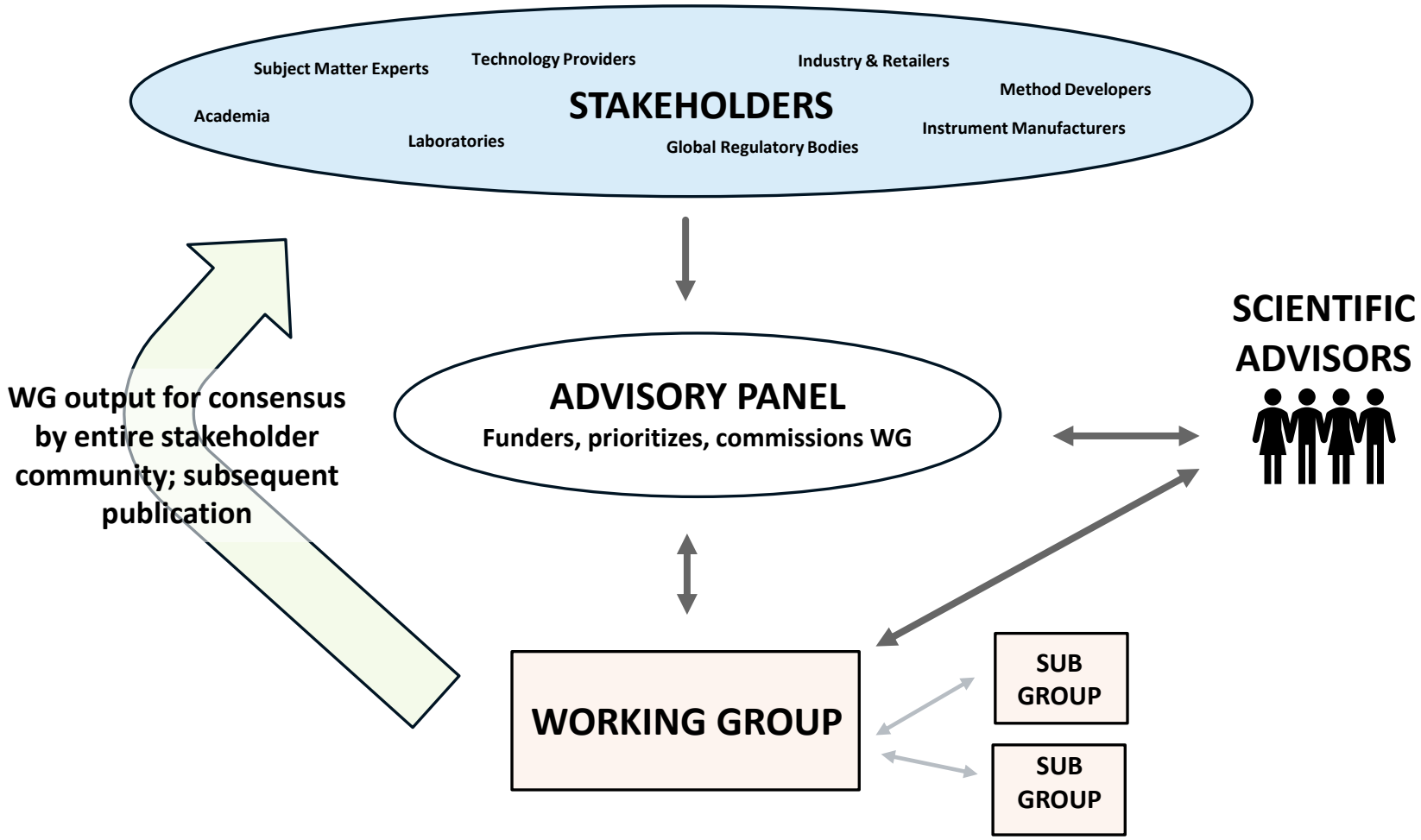
INCLUDES METHOD ACCEPTANCE REQUIREMENTS

PUBLISHED AS A STANDARD IN THE OFFICIAL METHODS OF ANALYSIS

USED TO ADOPT AOAC OFFICIAL METHODS VIA EXPERT REVIEW PANELS

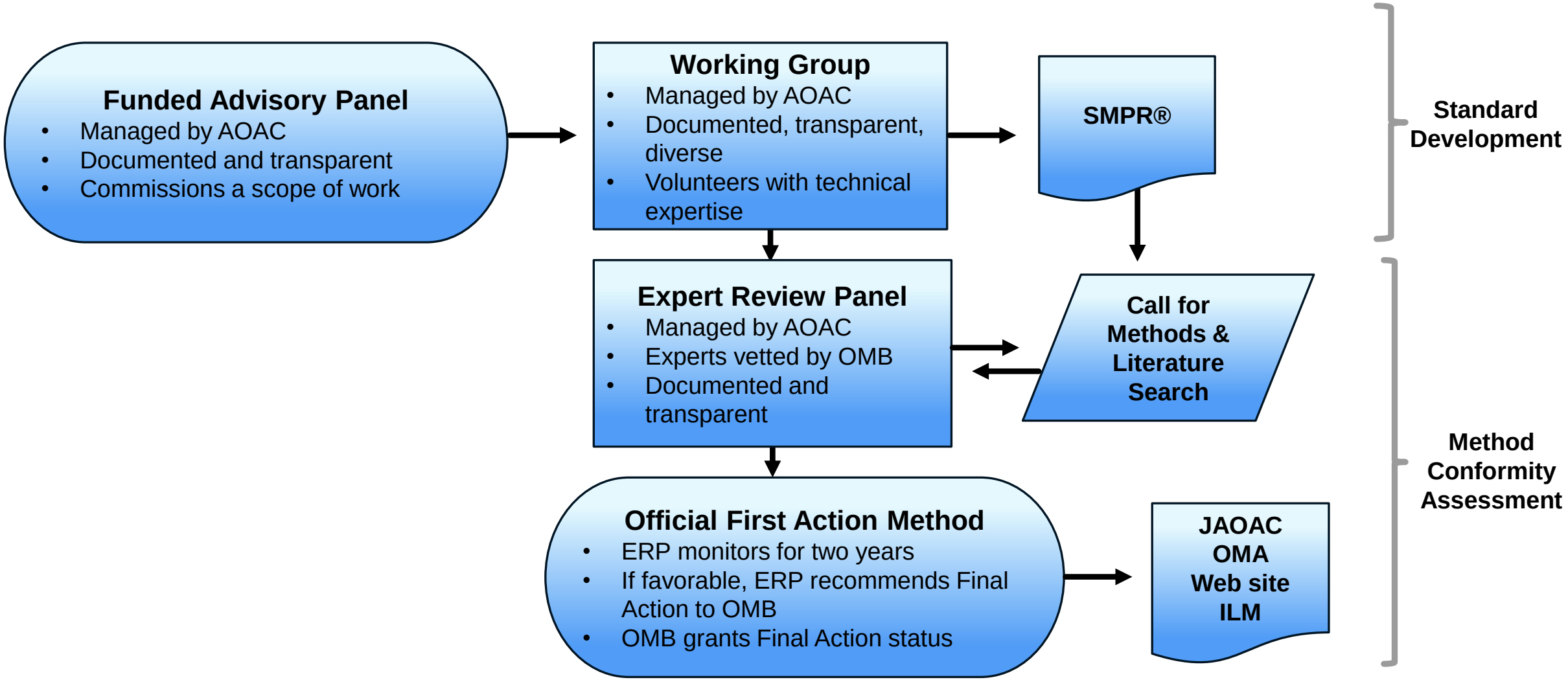
A SMPR IS NOT A METHOD

THE AOAC PROCESS



- The Advisory Panel member organizations fund, prioritizes and commissions the technical Working Group
- A diverse Working Group tackles the technical method requirements in the process of creating a Standard Method Performance Requirement Document™
- Scientific Advisors from regulatory agencies or other entities may also provide guidance and input
- Once completed, the standard will undergo a consensus process including stakeholder feedback, public comment and voting
- The finalized standard will be published and will lead to an open Call for Methods

FILLING ANALYTICAL METHOD GAPS



Contact
Pam Coleman
pcoleman@aoac.org