



Rege[N]ation

Analyzing Heavy Metals in Conventionally and Regeneratively Produced Foods

A Collaboration with American Indian Foods

MTP2



MONTANA POLLUTION PREVENTION PROGRAM

EMPOWERING BUSINESSES TO BE PART OF THE SOLUTION, NOT THE POLLUTION.

Shelby Smith

Dr. Wan-Yuan Kuo - Department of Food Systems, Nutrition, and Kinesiology, Montana State University, Bozeman, MT, USA

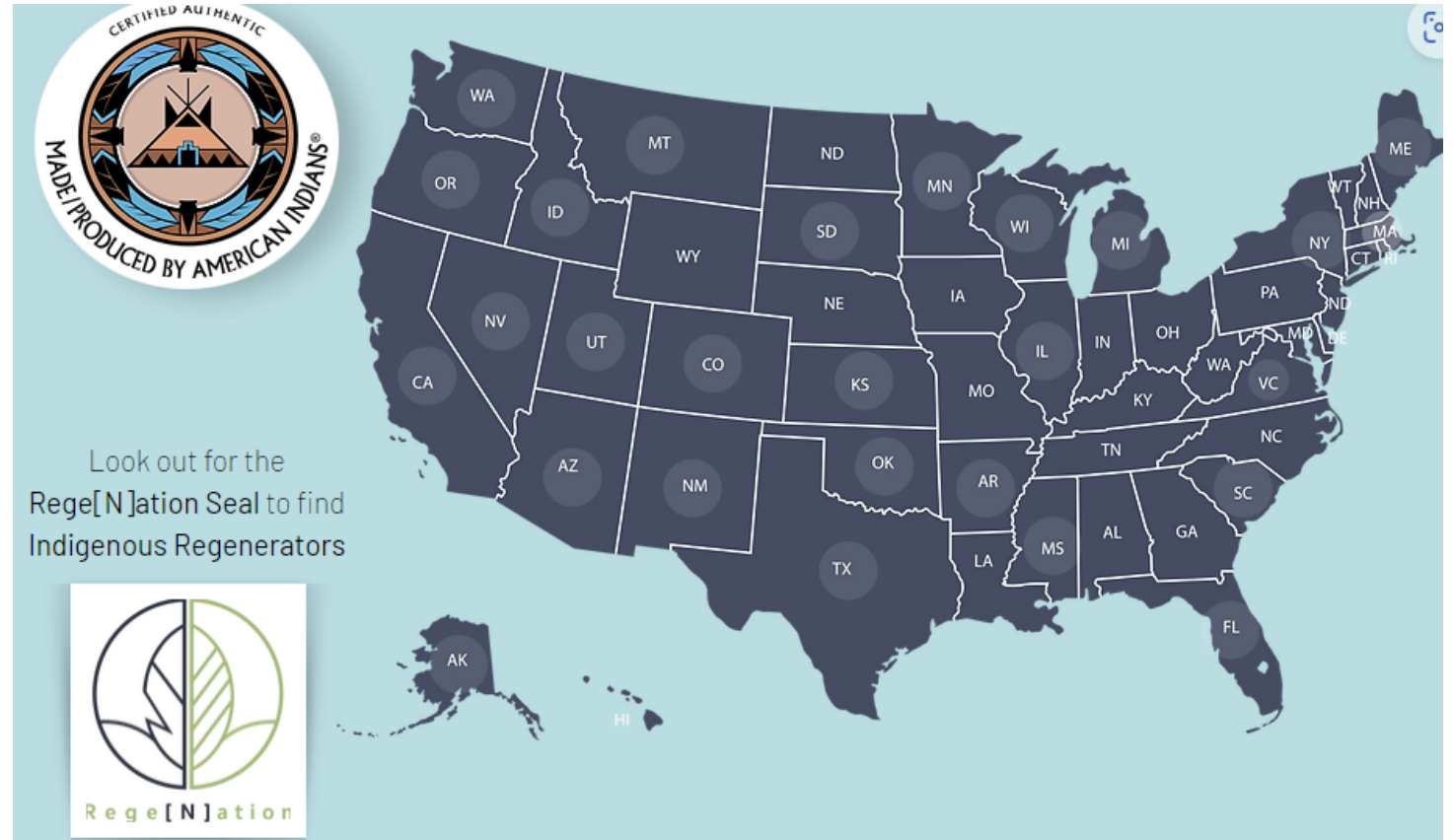
Self Intro

- Major: Food and Nutrition
- Career Interest: MD, specializing in family medicine.
- Why P2? Another perspective on nutrition.



AIM

- Established heavy metal analysis protocol for AIF to potentially utilized in establishing rege[N]ation certification metrics to ensure safety of their distributed goods.



Significance

Recommended P2 Actions		If Implemented:						If Not Implemented:	
		\$	Annual Reductions						
One-time Cost to Implement (\$)	Annual Savings from P2 Action (\$)	Hazardous Material input (lbs)	Hazardous waste (lbs)	Air emissions (lbs)	Water pollution (lbs)	MTCO ₂ e emissions (tons)	Water use (gal.)	Barrier to Implement	Plans to Implement within 5 years? (pick Y/N)



Regenerative Farming:

- 20% global agricultural greenhouse gas emissions
- +40% crop yields
- +15-20% water percolation

*Has the potential to eliminate upwards of 250 million metric tons of co2 annually!

The American Indian Foods Program

- Indigenous Agriculture
- Branch of Intertribal Agricultural Council
- Export Program
- Rege[N]ation
- Future Interest: PFAS & Regeneratively Grown AIF Products



Areas of Focus

- Regenerative Farming
- Food and Water Safety
- Supporting Local and Indigenous Farmers



Trials

- Moisture Analysis
- Dry Ashing
- Nitric Acid Dilution
- Micron Filter
- ICP-MS
- Interpret Data & Compare to Health Standards

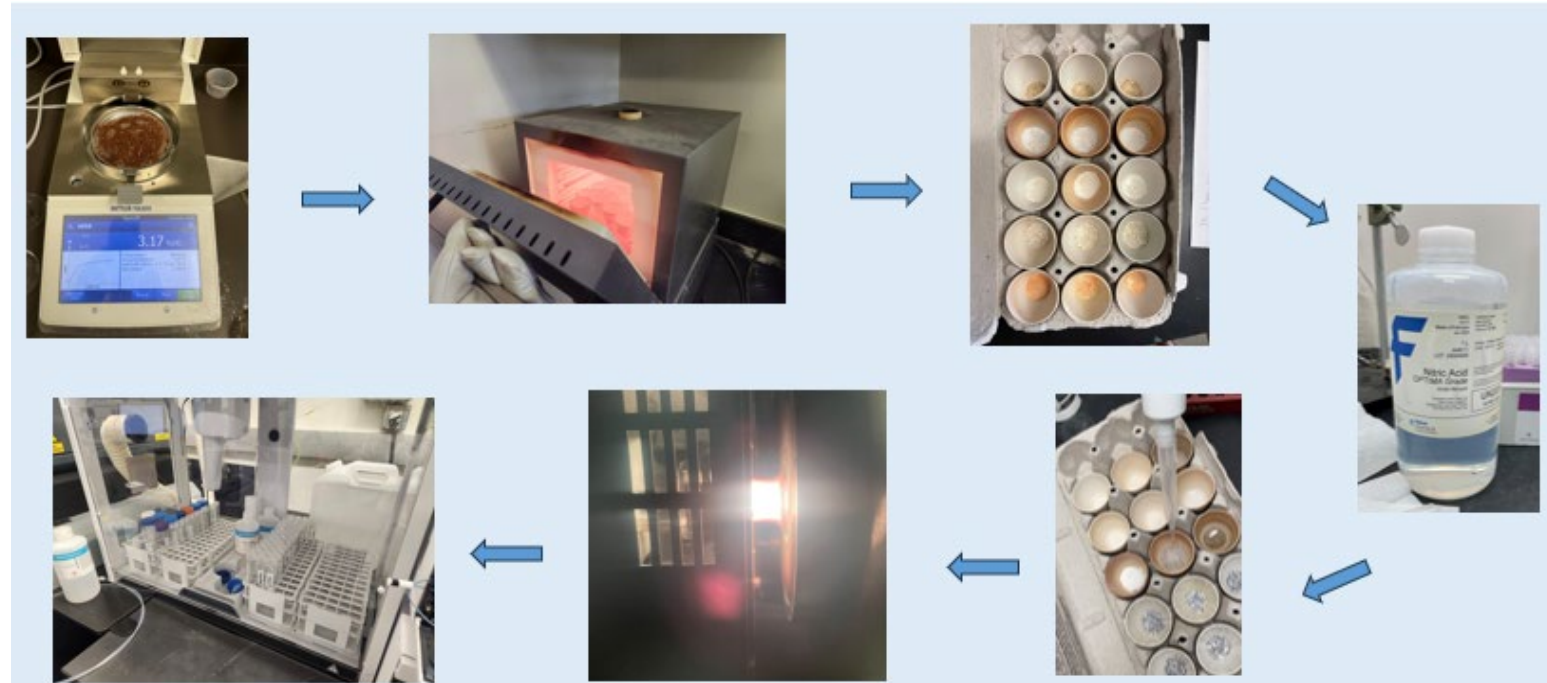


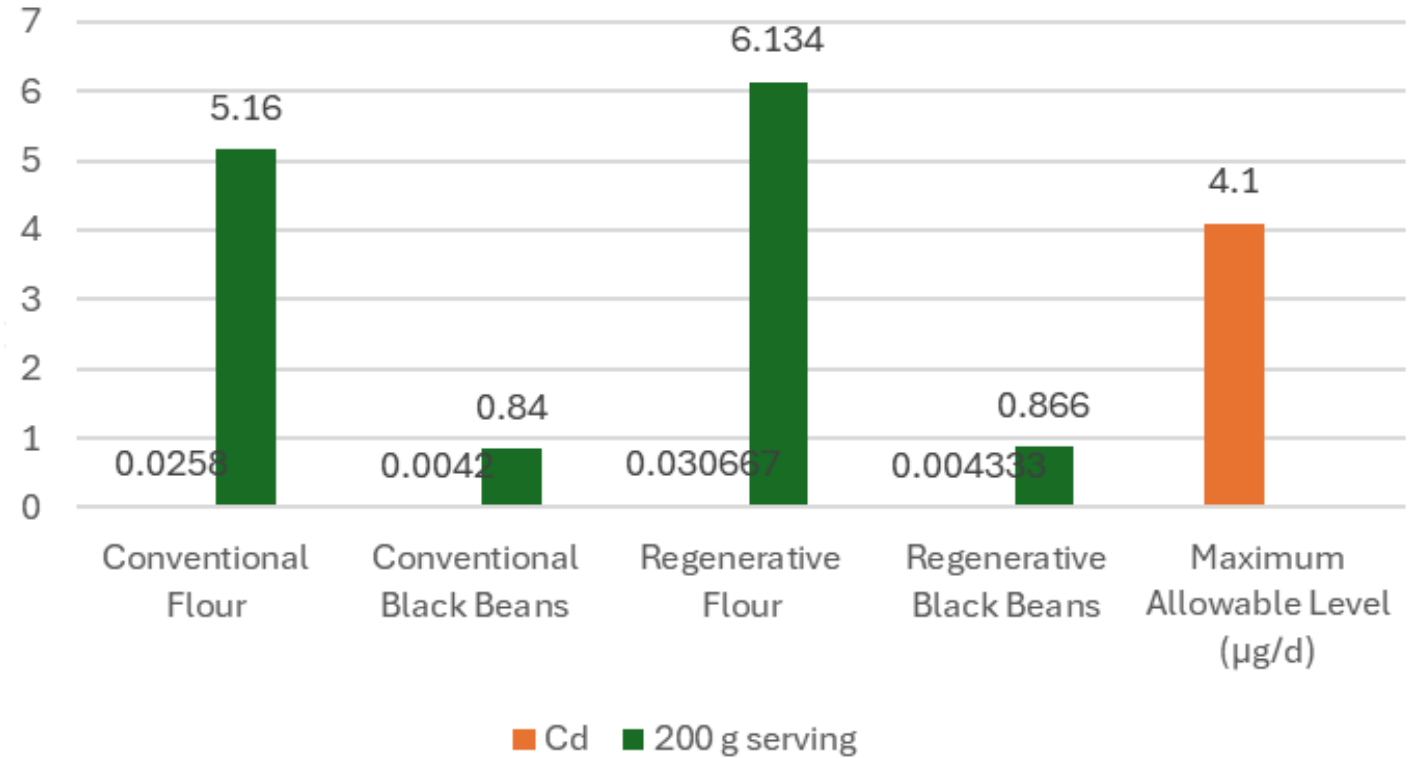
Figure 2: Entire Protocol Process

Results

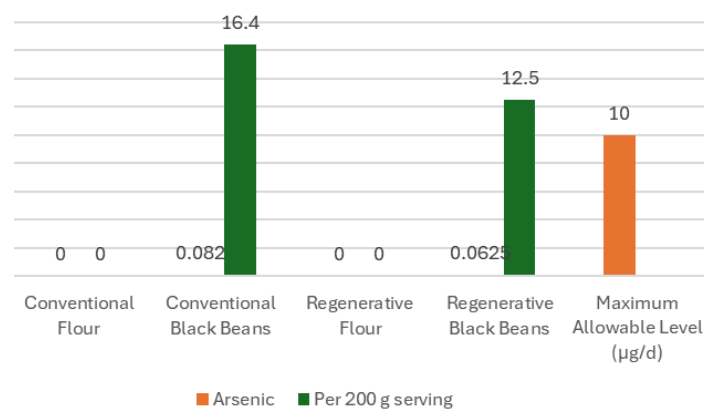
- Regenerative vs. Conventional
- Maximum Allowable Level in a Day
- Serving Size: 200 grams



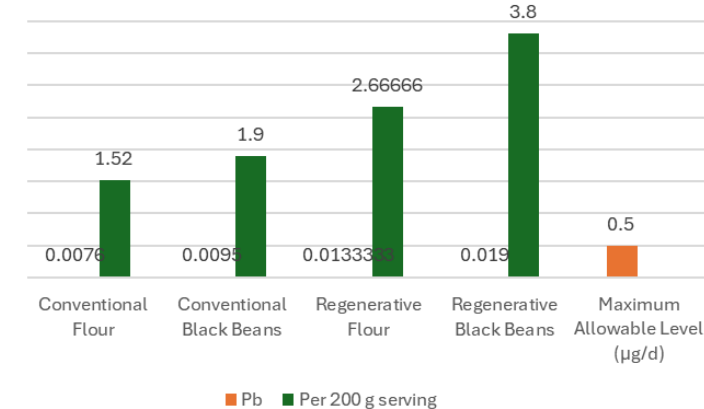
Cadmium



Arsenic



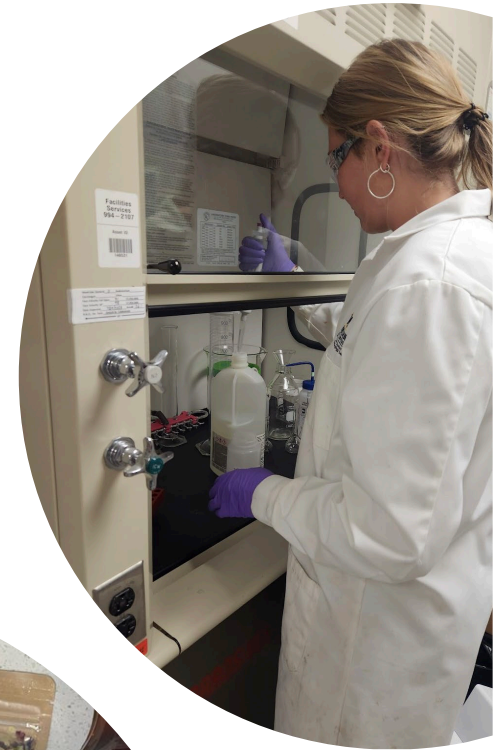
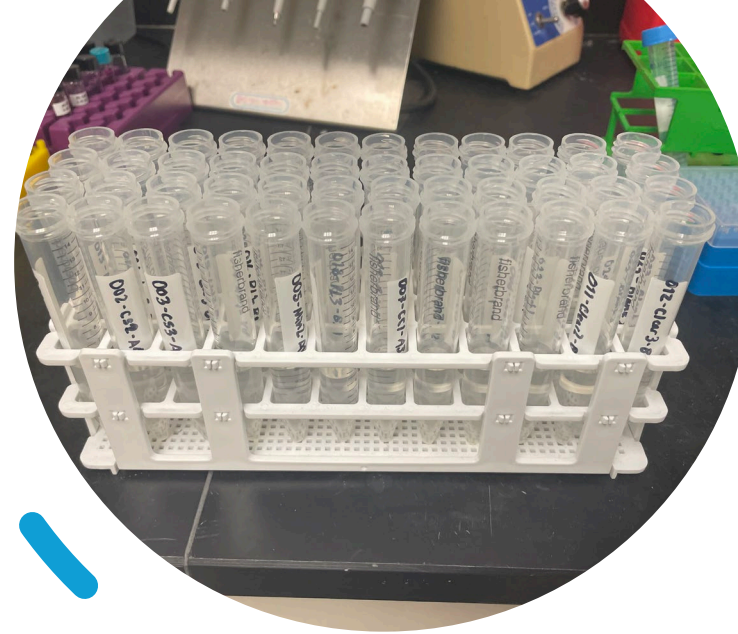
Lead



Outcomes

Established heavy metal analysis protocol for AIF to potentially utilized in establish rege[N]ation certification metrics and ensure safety of their distributed goods.

Data regarding conventional and regenerative food products





Thank you

- *Funding for the Montana State Mass Spectrometry Facility used in this publication was made possible in part by the MJ Murdock Charitable Trust, the National Institute of General Medical Sciences of the National Institutes of Health under Award Numbers P20GM103474 and S10OD28650, and the MSU Office of Research and Economic Development . The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health.*
- This research was funded by INBRE, McNair, Montana Pollution Prevention (MTP2), and MONT, and in collaboration with the American Indian Foods program. Facility collaboration included the Montana State Mass Spectrometry Facility and MSU Soils Testing Laboratory.
- This project was funded by a Forrest E. Mars, Jr. Chocolate History Research Grant and an Environmental Protection Agency (EPA) Pollution Prevention grant (EPA-HQ-OPPT-2022-001; 66.708). It has not been formally reviewed by Mars Wrigley or the EPA. The views expressed in this publication are solely those of the authors and do not necessarily reflect those of these organizations. Mars Wrigley and EPA do not endorse any products or commercial services mentioned in this publication.

