



Food and Agriculture  
Organization of the  
United Nations

# *Prevention and reduction of contaminants in cocoa in Venezuela*

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**Assessing and  
mitigating soil  
pollution in  
cocoa-growing  
plantations in  
Latin America  
and the  
Caribbean**

**HYBRID EVENT  
TRINIDAD AND TOBAGO**



**27 and 28  
January  
2025**



# Prevention and reduction of contaminants in cocoa in Venezuela

## HISTORY

**Pre-Columbian era:** Cocoa was cultivated by indigenous people long before the arrival of the Spanish. The seeds were used as currency and in religious ceremonies.

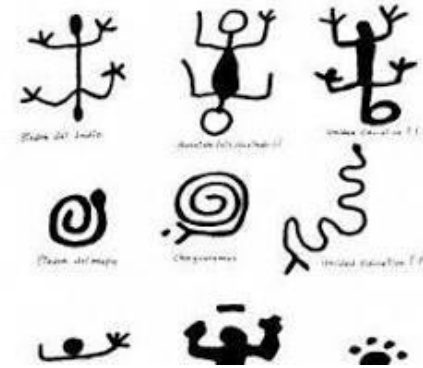
**Arrival of the Spanish (16th century):** Spanish colonizers saw the potential of cocoa and began exporting it to Europe. Venezuela became one of the world's leading cocoa producers.

**17th - 18th century:** Venezuelan cocoa was highly appreciated in Europe for its high quality. Large cocoa plantations were developed

**19th Century:** The War of Independence and other internal conflicts affected cocoa production. The rise of coffee as an export product also diminished the importance of cocoa.

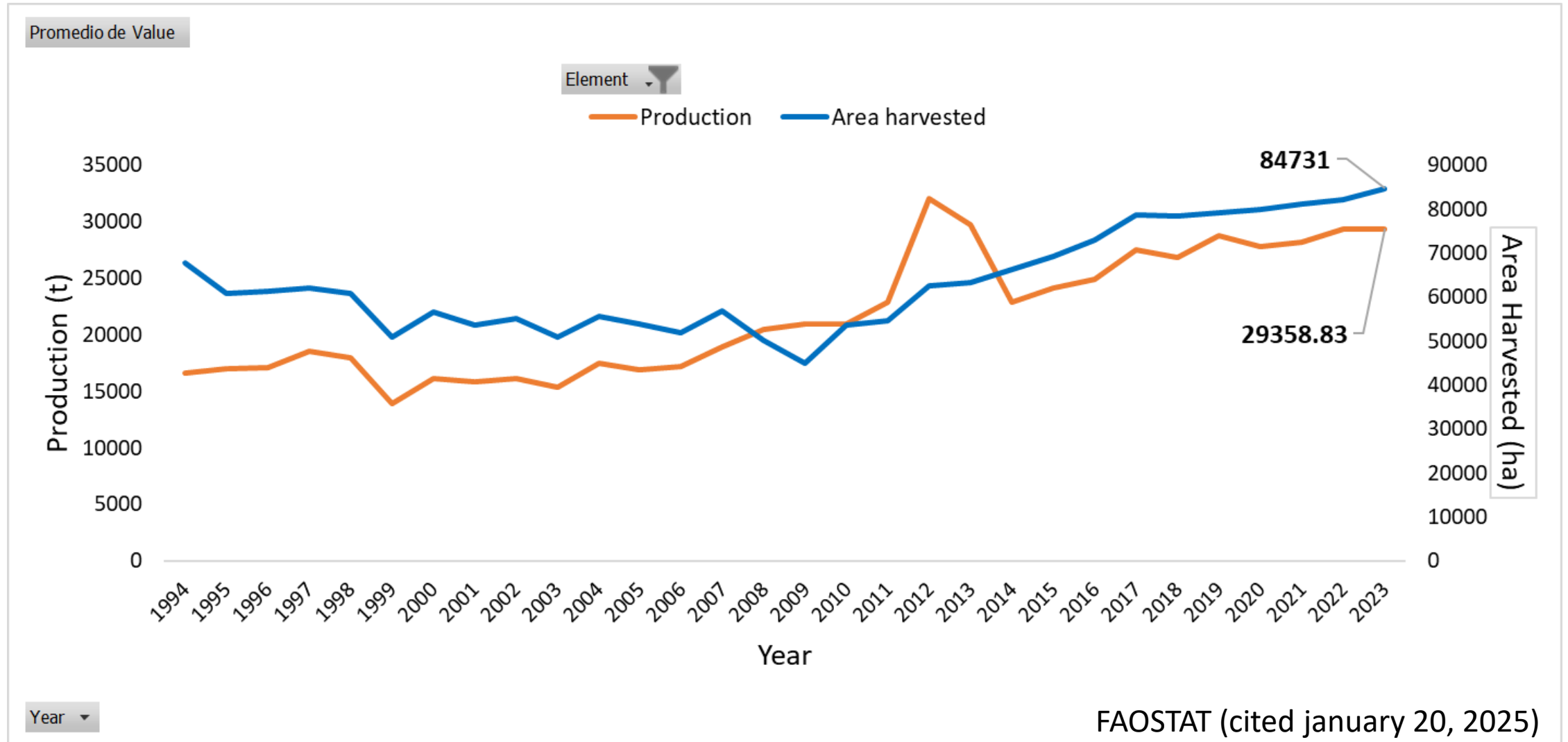
**20th - 21st Century:** Despite the challenges, Venezuelan cocoa continues to be recognized for its exceptional quality. Efforts are being made to revitalize the cocoa industry and promote the consumption of Venezuelan chocolate worldwide.

Ramirez, 2015



# Prevention and reduction of contaminants in cocoa in Venezuela

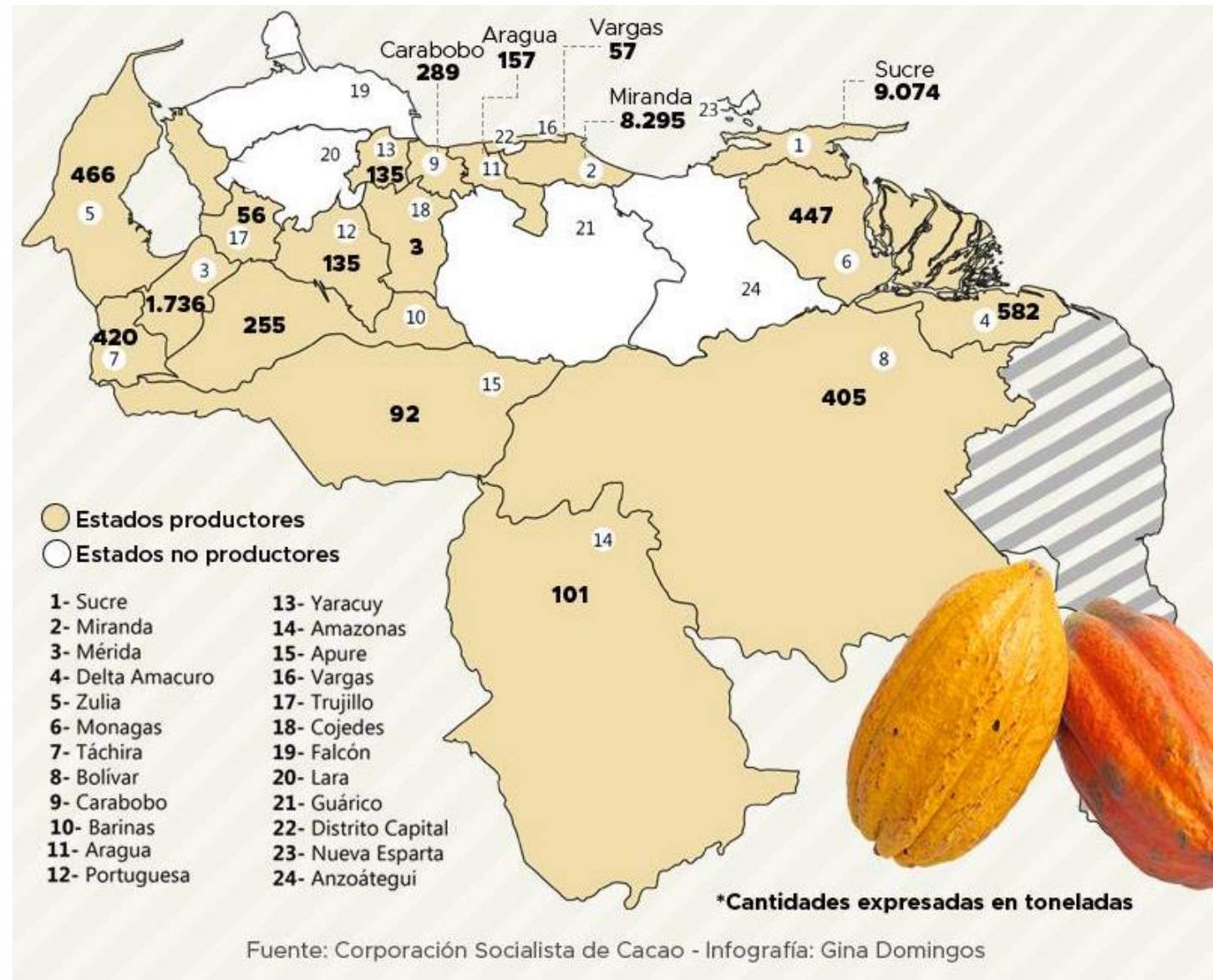
## PRODUCTION



# Prevention and reduction of contaminants in cocoa in Venezuela

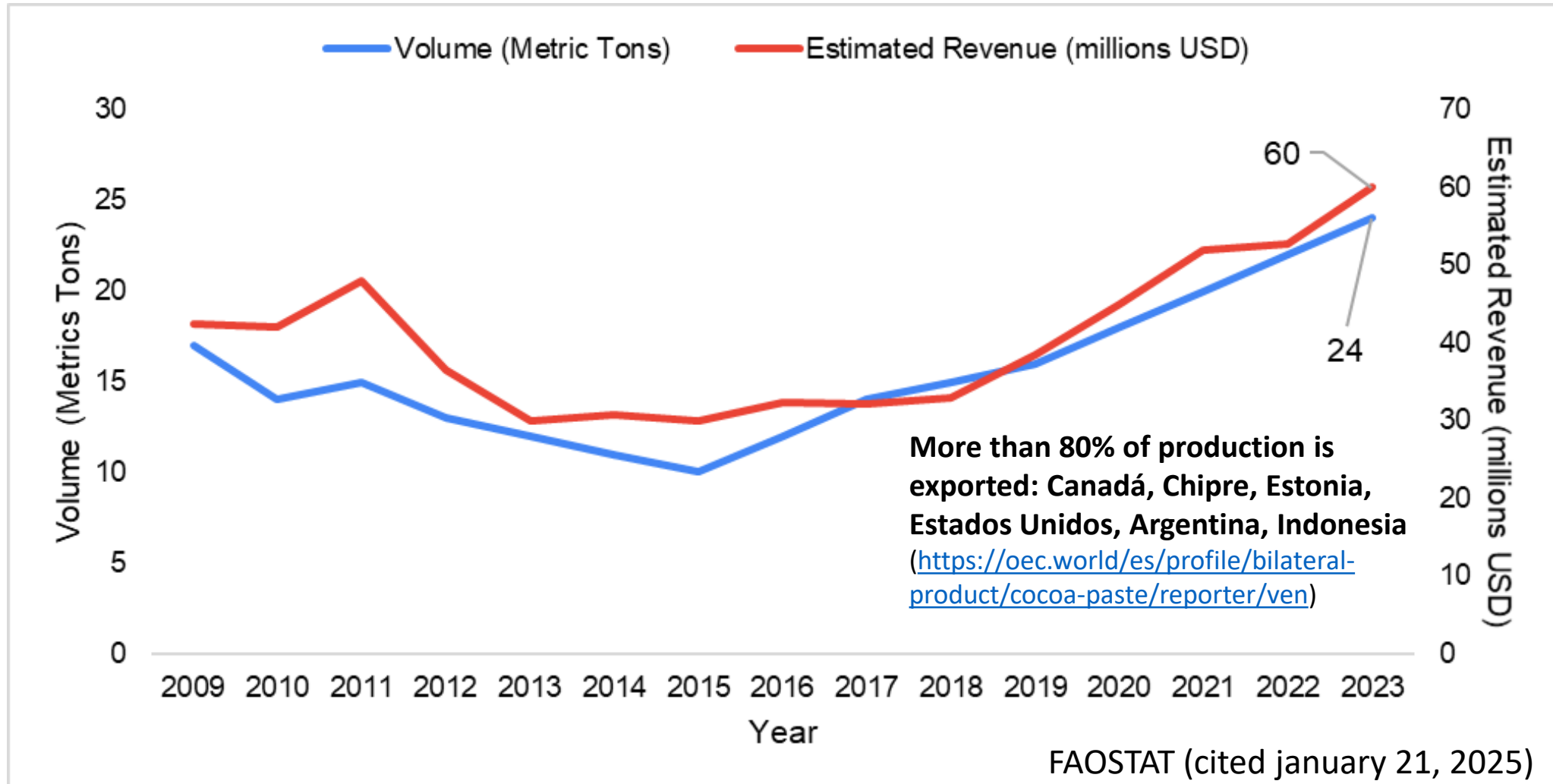
## PRODUCTION

### Production map for 2019



# Prevention and reduction of contaminants in cocoa in Venezuela

## EXPORTS



# Prevention and reduction of contaminants in cocoa in Venezuela

## INTERNATIONAL REGULATIONS

The annex to Regulation (EC) No 1881 / 2006 which modified as follows Subsection 3. 2 (Cadmium) is replaced by the following text:



3.2	Cadmium	Effective from 01-01-2019 mg/kg
<b>SPECIFIC COCOA AND CHOCOLATE PRODUCTS <sup>(49)</sup></b>		
3.2.7	Milk chocolate with a total cocoa solids content of < 30%	0.10
	Chocolate with a total cocoa solids content of < 50% Milk chocolate with a total cocoa solids content of ≥ 30%	0.3
	Chocolate with a total cocoa solids content of ≥ 50%	0.8
	Cocoa powder sold to the final consumer or as an ingredient in sweetened cocoa powder sold to the final consumer (drinking chocolate)	0.6

(49) In the case of specific cocoa and chocolate products, the definitions laid down in points A2, A3 and A4 of Annex I to Directive 2000/36/EC of the European Parliament and of the Council of 23 June 2000 relating to cocoa and chocolate products intended for human consumption (OJ L 197, 3.8.2000, p. 19) shall apply.

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## **NATIONAL REGULATIONS**

<b>COVENIN Standard</b>	<b>Description</b>
COVENIN 52:1999 (beans)	Establishes limits for arsenic (As) 0.5 mg/kg, copper (Cu) 15 mg/kg and lead (Pb) 0.5 mg/kg; for cadmium there are no documented levels in this standard.
COVENIN 50:1995 (beans)	Mentions the control that must be done to contaminants such as aflatoxins, does not refer to any heavy metal that should be measured in this raw material.
COVENIN 1479:1998 (Fondonorma, 1998b, 4), which establishes requirements for cocoa powder COVENIN 1480:1998, for cocoa liquor	Determines maximum levels for arsenic (As) 1 mg/kg, copper (Cu) 5 mg/kg, lead (Pb) 0.5 mg/kg and iron (Fe) 2 mg/kg; cadmium is not mentioned in these standards.
For chocolate analogues or substitutes, Venezuela (Fondonorma, 2000, 4).	Establishes the same levels of heavy metals as those for chocolate: arsenic (As) 0.5 mg/kg, copper (Cu) 15 mg/kg and lead (Pb) 0.5 mg/kg; there are no levels for cadmium.
COVENIN 1336	Maximum recommended concentration of Cadmium in cocoa beans is 0.3 mg/kg.

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## **NATIONAL REGULATIONS**

### **Venezuelan Standard COVENIN 50:2016 Cocoa beans third revision**

Requirements	Maximum recommended concentration (mg/Kg)	Test Method
Cadmium	0.3	COVENIN 1336
Copper	15.0	COVENIN 1215
Lead	0.5	COVENIN 1335
Arsenic	0.5	COVENIN 948
Mercury	0.005	COVENIN 1407
Ochratoxin A	0.010	CODEX
Pesticides	CODEX	CODEX

Note: The established limits and methods suggested in the respective provisions issued by the Codex Alimentarius in force to date must be used.

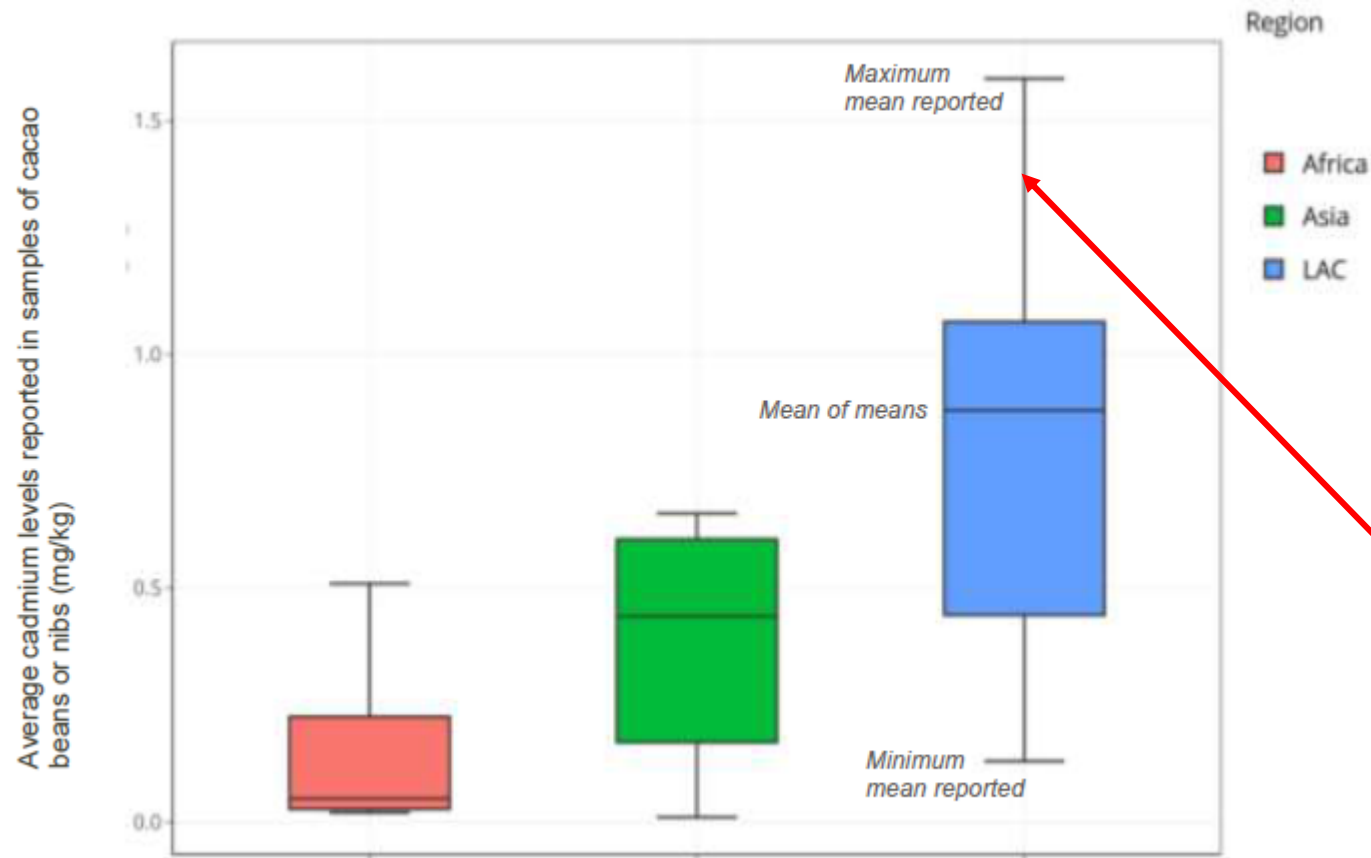


# Prevention and reduction of contaminants in cocoa in Venezuela

## HEAVY METALS IN VENEZUELA



Figure 2 Distribution of reported average cadmium levels in cacao beans from Africa, Asia and LAC<sup>1</sup>



(see Annex 1 for more information)

Meter at al. (2019)

Data from Venezuela  
0.10 – 9.04 mg kg<sup>-1</sup>

Mean = 1.53 mg kg<sup>-1</sup>  
Median = 1.30 mg kg<sup>-1</sup>

60% are above of 0.6 mg kg<sup>-1</sup>  
(ICCO, 2012)

90% are above of 0.3 mg kg<sup>-1</sup>  
(COVENIN 1336)

# Prevention and reduction of contaminants in cocoa in Venezuela

## HEAVY METALS IN VENEZUELA

### Barlovento



**MATISSEK, 1990.**  
Beans : 0.54 – 4.10 mg/kg



**SHORIN ET AL., 1992**  
Soils: 0.25 – 0.65 mg/kg    Beans : 0.23 – 9.04 mg/kg

**0.6 mg/kg**  
**(ICCO, 2012)**

← **beans**

**CRITICAL LEVELS**

**soil** →

**0.43 mg/kg**  
**(USEPA, 2002)**

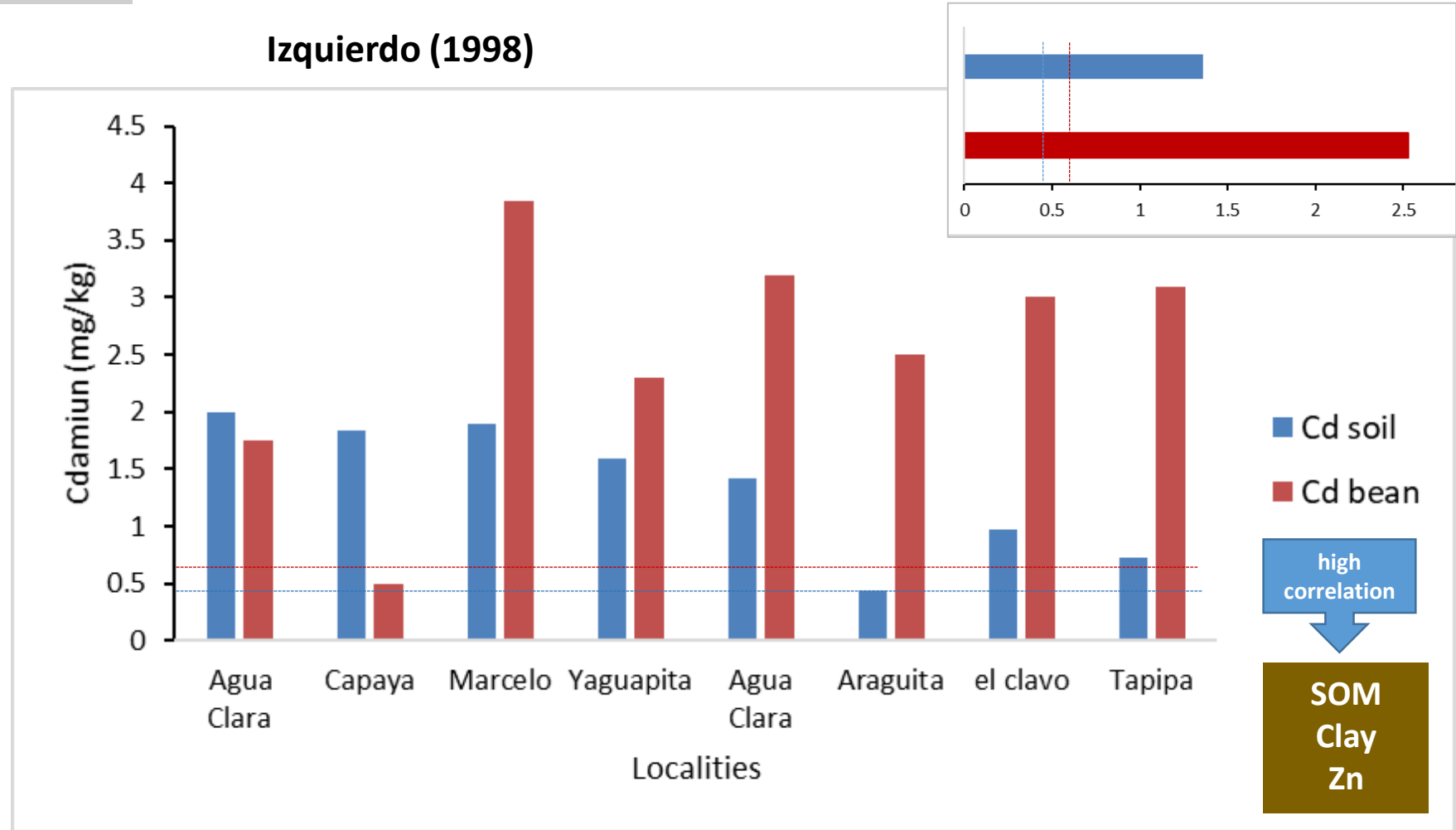
# Prevention and reduction of contaminants in cocoa in Venezuela

## HEAVY METALS IN VENEZUELA

### Barlovento



Izquierdo (1998)



0.6 mg/kg  
(ICCO, 2012)



**CRITICAL LEVELS**



0.43 mg/kg  
(USEPA, 2002)

# Prevention and reduction of contaminants in cocoa in Venezuela

## HEAVY METALS IN VENEZUELA

### CADMIUM CONTAMINATED COCOA BEANS

YEARS 2009 & 2011

Location	Samples	Cadmium* (mg/Kg)	Contaminated Samples	Percentage
Barlovento	58	0.61 - 3.41	49	86.48
Sur del Lago	103	0.41 - 2.50	25	24.27
Eastern	105	0.40 - 2.09	30	28.57
Barinas	15	0.54 -2.08	10	66.67

\* Range of contamination (Critic Level 0.4 mg/kg)

Source: Nestle C.A.



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## HEAVY METALS IN VENEZUELA

### LEAD CONTAMINATED COCOA BEANS

YEARS 2009 & 2011

Location	Samples	Lead* (mg/Kg)	Contaminated Samples	Percentage
Barlovento	55	0.02 - 0.81	38	69.09
Sur del Lago	99	0.02 - 2.26	67	67.67
Eastern	98	0.02 - 4.17	58	59.18
Barinas	13	0.02 - 0.22	1	7.69

\* Range of contamination (Critic Level 0.2 m/kg)

Source: Nestle



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## HEAVY METALS IN VENEZUELA

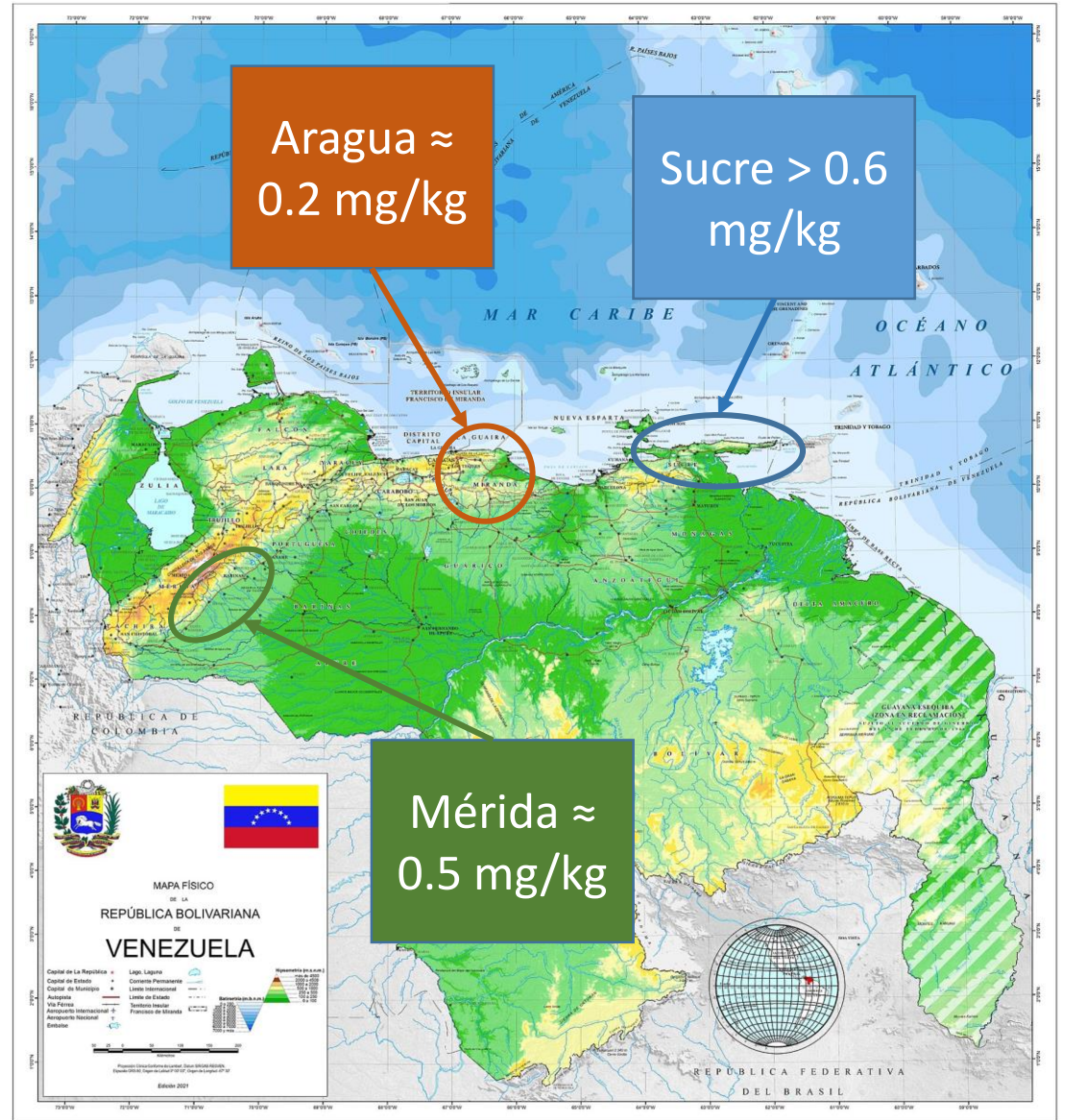
CROZIER, 2014

Beans : 0.03 – 3.52 mg/kg

18 > 0.6 mg/kg (20%)

92 samples

74 < 0.5 mg/kg



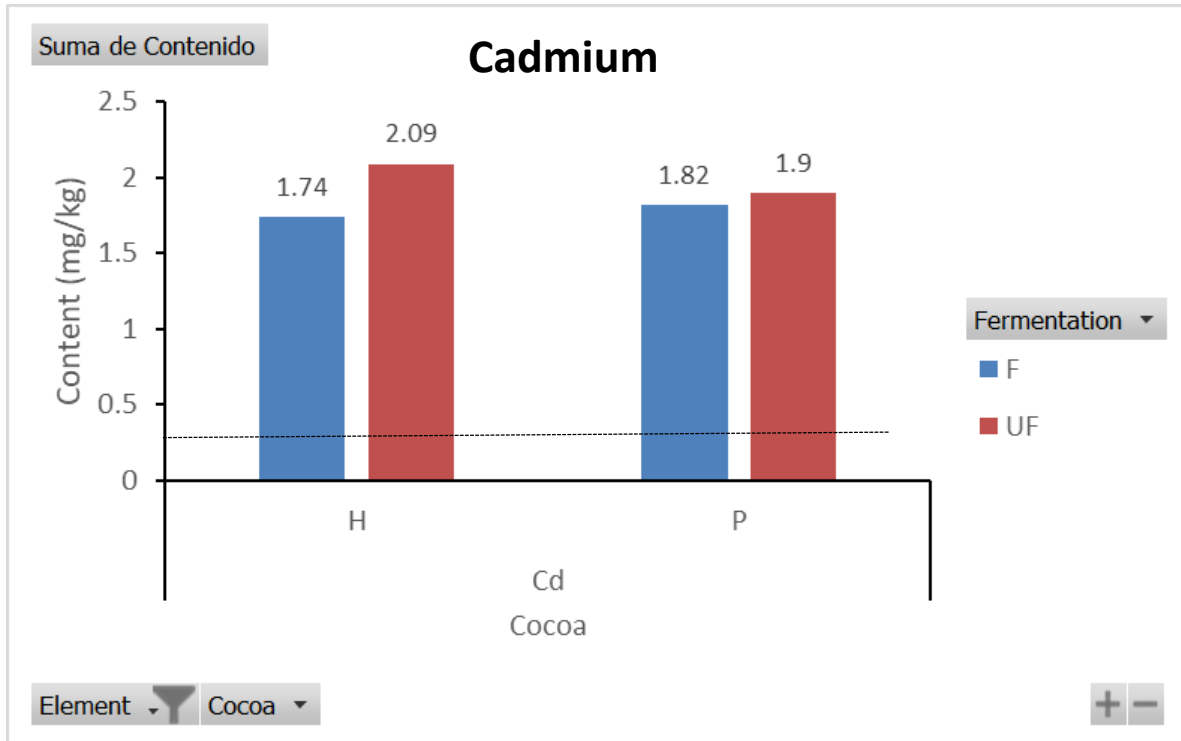
# Prevention and reduction of contaminants in cocoa in Venezuela

## HEAVY METALS IN VENEZUELA

Santa Bárbara del Zulia , Venezuela – 2012

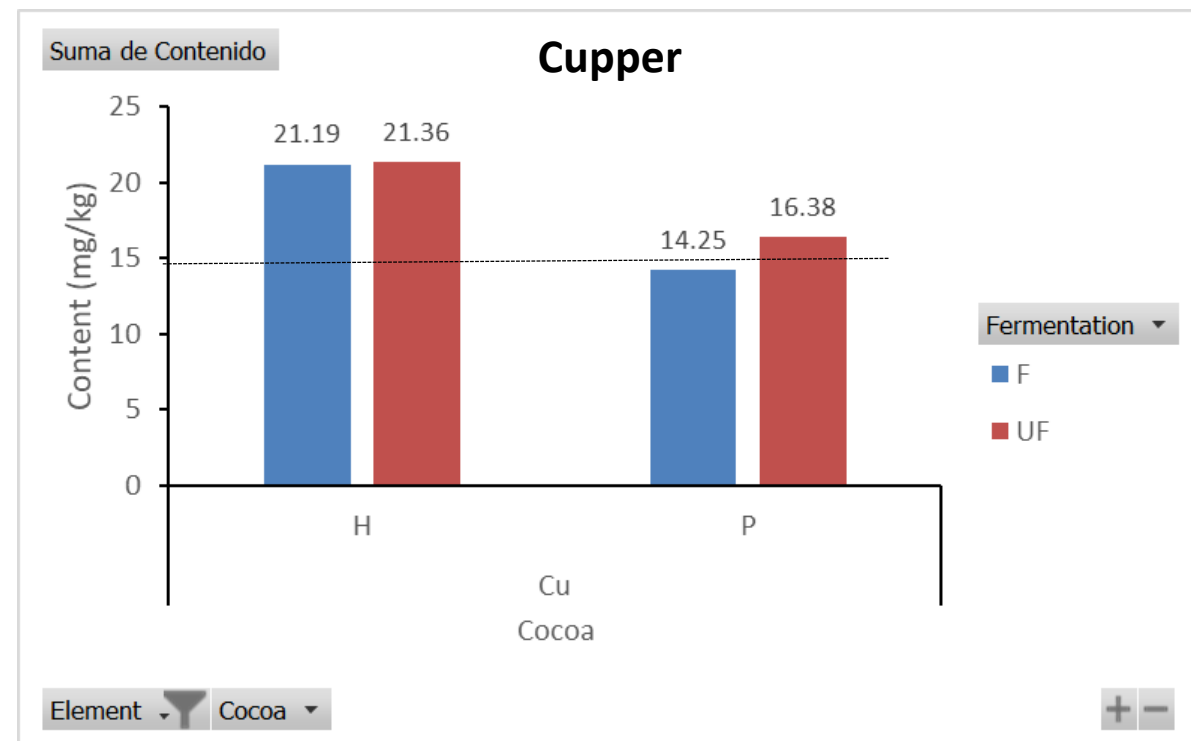
Lanza et al. (2016)

BEANS



H: Hybrid

P: Porcelana



F: Fermented

UF: Unfermented

# *Prevention and reduction of contaminants in cocoa in Venezuela*

## CHALLENGES

- **Soil variability:** Venezuela's geology is diverse, and heavy metals levels in soil vary significantly across regions. This makes it difficult to implement universal solutions.
- **Agricultural practices:** Some agricultural practices in new plantations, such as the use of fertilizers with high cadmium content, can contribute to contamination.
- **Awareness:** Many cocoa farmers are unaware of the heavy metals problem and its consequences for health and trade.
- **Limited resources:** Investment in research, training, and technology to reduce heavy metals pollution may be limited.
- **Monitoring and control:** The lack of an effective monitoring and control system makes it difficult to assess the magnitude of the problem and implement corrective measures.



## *Prevention and reduction of contaminants in cocoa in Venezuela*

### **DATA GAPS**

- **Risk maps:** Detailed maps showing the distribution of heavy metals in the soils of cocoa-producing areas are needed.
- **Data on agricultural practices:** It is crucial to gather information on agricultural practices that influence cadmium and other heavy metals uptake by cocoa plants (liming, organic matter application).
- **Heavy metals levels in cocoa:** Continuous and systematic monitoring of heavy metals levels in cocoa beans from different regions is required.
- **Impact studies:** More studies are needed on the impact of heavy metals on human health and the environment in Venezuela.

# *Prevention and reduction of contaminants in cocoa in Venezuela*

## GOVERNMENT INITIATIVES

- **National Cocoa Plan (2001 - Venezuelan Socialist Cocoa Corporation S.A. - CSCV):**
  - **Technical assistance:** Providing producers with training in good agricultural practices, pest and disease management, and post-harvest techniques (<https://mincyt.gob.ve/plan-nacional-de-cacao-promueve-formacion-de-20-mil-productores-en-el-pais/>).
  - **Financing:** Facilitating access to credit and financing for the renovation of plantations, acquisition of inputs, and improvement of infrastructure.
  - **Research:** Promoting scientific research to improve the productivity and quality of Venezuelan cocoa.
- **Creation of a Cocoa Price Support and Stabilization Fund (2016):** to protect producers from international price fluctuations, guaranteeing a fair price for their product.
- **Exemption from taxes on cocoa exports (2022):** to encourage exports and improve the competitiveness of Venezuelan cocoa in the international market (<https://acortar.link/XD4LWI>)
- **Promotion of Venezuelan cocoa at international fairs:** Venezuelans win six awards at the International Chocolate Awards Europe (<https://www.ciip.com.ve/venezolanos-ganan-seis-reconocimientos-en-international-chocolate-awards-europa/>)
- **Support for the production of artisanal chocolate:** Programs have been implemented to support small-scale artisanal chocolate producers, promoting the diversification of production (<https://oci.merida.gob.ve/2024/09/09/promueven-el-chocolate-artesanal-en-la-casa-de-los-antiguos-gobernadores/>)

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## CONCLUSIONS

- 1. High Cadmium Levels in Venezuelan Cocoa:** A significant proportion of Venezuelan cocoa beans, particularly those from the Barlovento region, exceed the maximum permissible limits for cadmium established by international and national standards.
- 2. Factors Contributing to Pollution:** There are several factors that contribute to heavy metal pollution in Venezuelan cocoa, including soil variability, agricultural practices (fertilization), limited awareness among cocoa farmers.
- 3. International and National Regulations:** Both international and national regulations have been established to control heavy metal contamination in cocoa products, with specific limits set for cadmium content in different types of chocolate and cocoa products.
- 4. Data Gaps Hinder Comprehensive Assessment:** There is a lack of comprehensive data on heavy metal distribution in cocoa-growing areas, the impact of agricultural practices on contamination, and the health and environmental consequences of cadmium in cocoa.
- 5. Government Support and Initiatives:** The Venezuelan government has implemented programs to support cocoa producers, including technical assistance, financing, research promotion, and price stabilization efforts.



إنتاج أفضل، وتغذية أفضل، وبيئة أفضل، وحياة أفضل.

更好生产、更好营养、更好环境、更好生活。

Better Production, Better Nutrition, Better Environment and Better Life.

Amélioration de la production, amélioration de la nutrition,  
amélioration de l'environnement et amélioration des conditions de vie.

Улучшение производства, улучшение качества питания,  
улучшение состояния окружающей среды и улучшение качества жизни.

Mejor producción, mejor nutrición, mejor medio ambiente y una vida mejor.

## ***TCP/RLA/3913 (D): Reduction of cadmium content in Amazonian cocoa***





Organización de las Naciones Unidas  
para la Alimentación y la Agricultura

## Beneficiary Countries:

*Brasil, Bolivia, Colombia, Ecuador, Perú  
and Venezuela.*

## Government Contractor(s):

*Ministries of Agriculture and  
Environment*

## Dates:

*October 2024  
May 2026*



<https://bit.ly/3TiQ2uu>



## *TCP/RLA/3913 (D): Reducción del contenido de cadmio en el Cacao Amazónico*

IMPACT

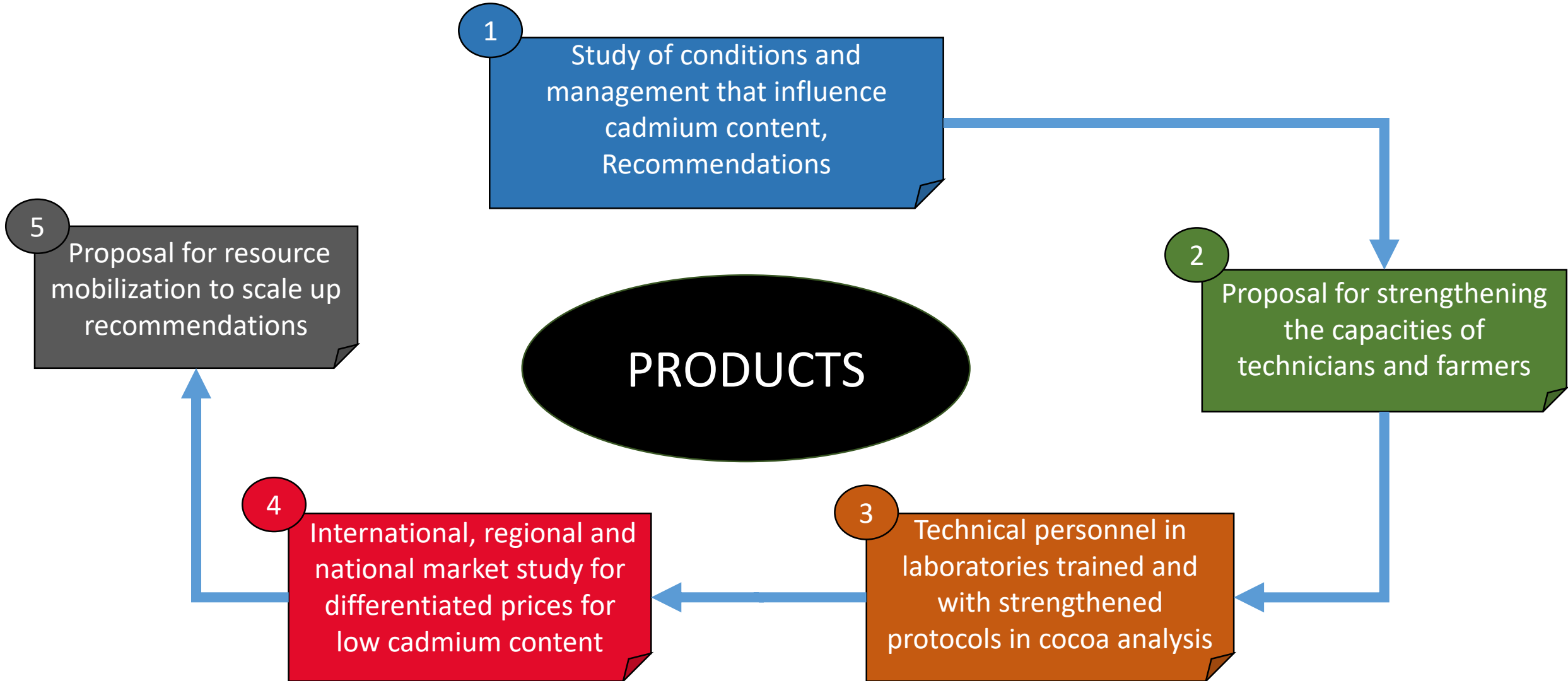
By 2030, family and indigenous cocoa producers in the Amazon region will increase their participation in markets that pay preferential prices for their low-cadmium cocoa beans (SDG 1, SDG 12) and contribute to the generation of regional ecosystem services (SDG 13, 15).

RESULT

Actors in the cocoa chain innovate, adopt and diversify management practices that increase the value of Amazonian cocoa as a product



## TCP/RLA/3913 (D): Reduction of cadmium content in Amazonian cocoa





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# THANK YOU



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