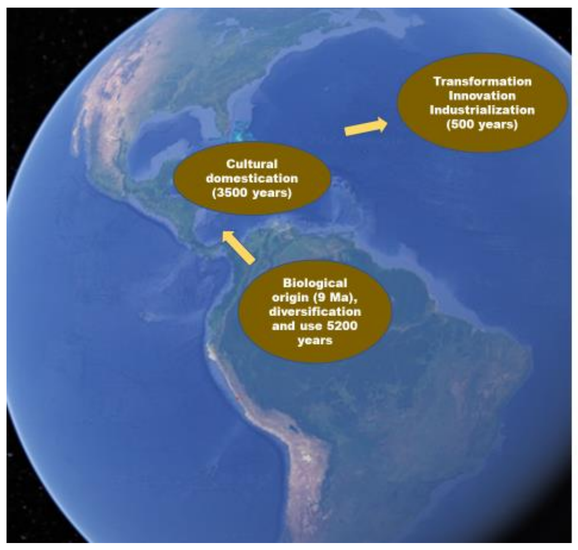
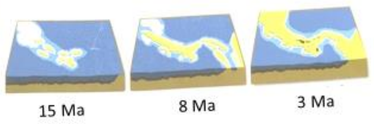
Utilization of cocoa genetic resources in Peru from university research (2016-2021)

CIENTÍFICA
UNIVERSIDAD CIENTÍFICA DEL SUR

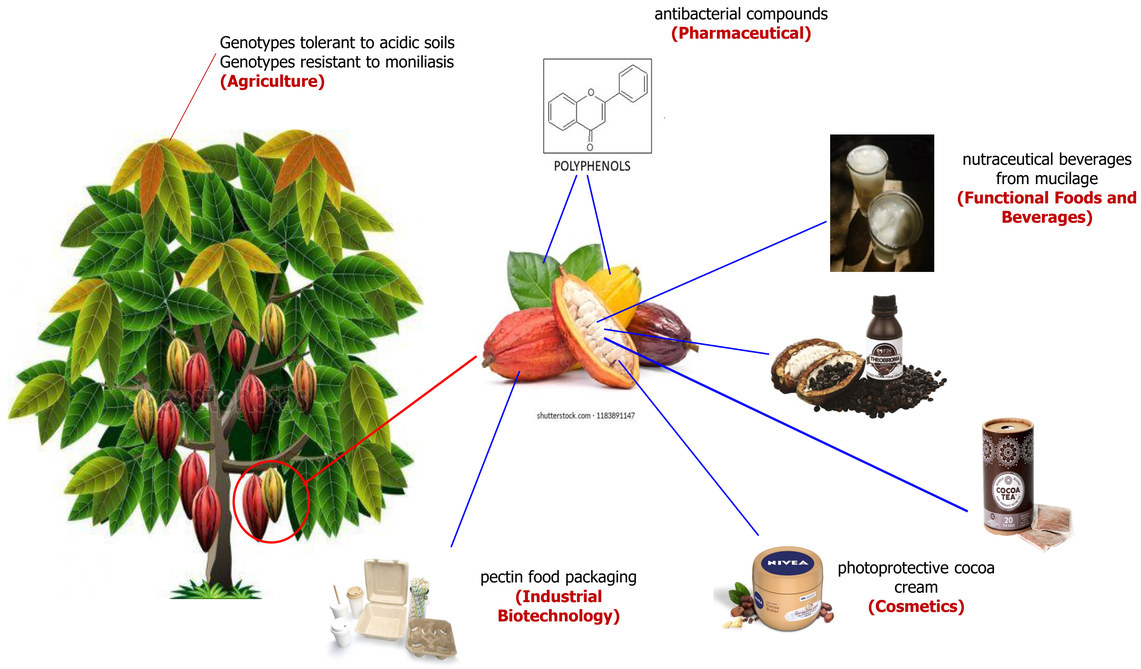


Cocoa Route along time and space



Cocoa was originated 10 Ma ago in South America, 3 Ma ago it radiated when the Panama Chanel was formed, and 500 years ago it was dispersed from Central America to Europe.

Identification of theses based on the utilization of genetic resources and derivatives of cocoa to obtain academic degrees in Peruvian universities. The uses of cocoa, coming from producers of 12 regions from Peru, were related to different productive sectors.



Producer Regions of Cocoa Perú 2020

https://www.gettyimages.es/detail/foto/cocoa-pods-imagen-libre-de-derechos/675497682

REGION	PRODUCERS (N°)	PRODUCTION (ton)
SAN MARTÍN	25,927	54,665.9
JUNIN	5,856	27,536.3
UCAYALI	5,340	21,690.0
HUANUCO	8,091	14,395.0
CUSCO	10,921	12,022.6
AYACUCHO	7,656	5,631.0
AMAZONAS	11,664	4,212.9
PASCO	1,173	4,033.5
CAJAMARCA	1,863	1,390.2
PIURA	1,891	1,385.0
MADRE DE DIOS	330	1,234.7
LORETO	2,035	956.2
TUMBES	291	832.5
PUNO	886	675.0
LAMBAYEQUE	87	98.5
LA LIBERTAD	35	32.9
Total	**84,046**	**150,792.2**

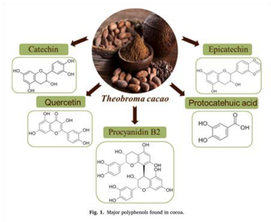
Escale (ton)

- > 50,000
- > 20,000 a 50,000
- > 10,000 a 20,000
- > 2,000 a 10,000
- > 500 a 2,000
- > 0 a 100
- 0

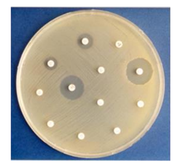
Added Value through the Utilization of Cocoa Genetic Resources: a Case

RESEARCH ➡ BIOPROSPECTING ➡ INNOVATION ➡ APPLICATION ➡ COMERCIALIZATION

Raw material as biological resource containing genetic resources and derivatives



Phytochemical screening

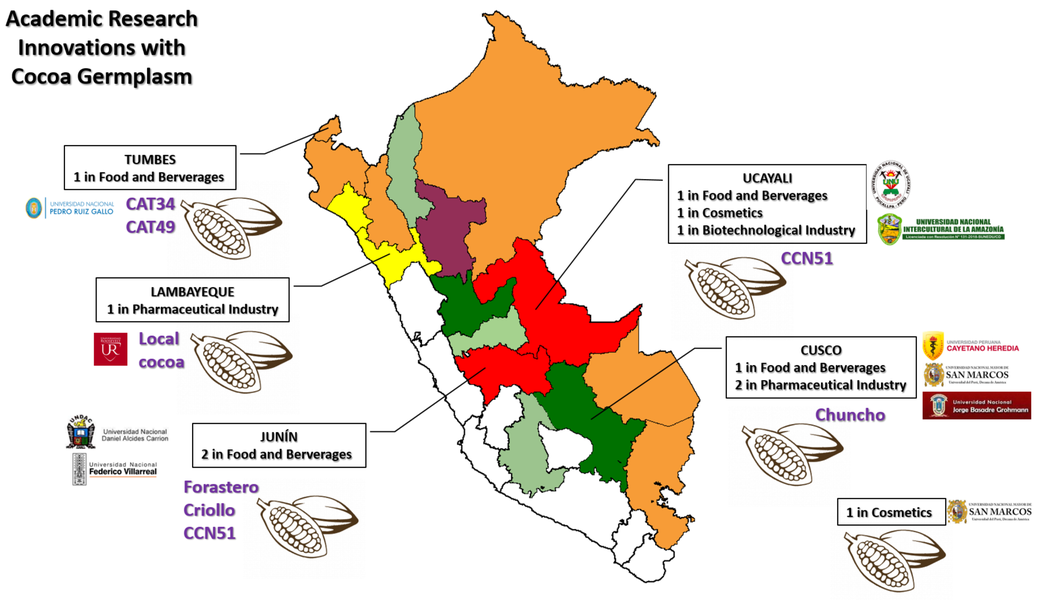


Antibacterial formulation

Preclinical trials treatment of dental plaque

Antibacterial tooth paste

Academic Research Innovations with Cocoa Germplasm



Peruvian Legal Frame of Access and Benefit-Sharing of Genetic Resources

CONVENTION ON BIOLOGICAL DIVERSITY

NAGOYA PROTOCOL ON ACCESS AND BENEFIT-SHARING

DECISION 391
COMMON REGIME ON ACCESS TO GENETIC RESOURCES

SD N° 003-2009-MINAM
REGULATION ON ACCESS TO GENETIC RESOURCES

SD N° 019-2021-MINAM
REGULATION ON ACCESS TO GENETIC RESOURCES AND ITS DERIVATIVES

PRODUCTIVE SECTOR	UTILIZATION	TYPE OF COCOA	REGIONS WHERE COCOA COMES FROM	SOURCE
Functional foods and beverages	Determinación de los compuestos bioquímicos y la actividad antioxidante de la cobertura de un chocolate comercial.	Chuncho	Cusco	Bobadilla Jiménez, JG. 2016. Título de Químico Farmacéutico. Universidad Nacional Cayetano Heredia.
	Formulación y elaboración de una bebida funcional a partir de la cascarilla del cacao.	Criollo Forastero	Junín	Loza de la Cruz R., Inga Orihuela EL. 2018. Título de Ingeniero en Industrias Alimentarias. Universidad Nacional Daniel Alcides Carrión - Filial La Merced
	Formulación de una bebida no alcohólica a partir del mucílago de las semillas del cacao.	CAT34 y CAT49	Tumbes	Rojas Sosa JM, Rojas Manayay ED.2017. Título de Ingeniero en Industrias Alimentarias. Universidad Nacional Pedro Ruiz Gallo.
	Elaboración de pan con adición de pasta de cacao con propiedades funcionales y degustativas.	CCN-51	Ucayali	González Ramírez, AT. 2019. Título de Ingeniero Agroindustrial. Universidad Nacional de Ucayali.
	Elaboración de galletas con propiedades funcionales a partir de sustituciones de harina de cáscara de cacao.	Criollo y CCN 51	Junín	Murillo Baca, 2018. Doctor en Ciencia de Alimentos. Universidad Nacional Federico Villarreal.
Pharmaceutical industry	Determinación de la actividad antimicrobiana de la semilla y cáscara de cacao sobre el esmalte dentario.	Chuncho	Cusco	Orihuela Gutiérrez JB. 2016. Título de Cirujano Dentista. Universidad Nacional Mayor de San Marcos.
	Evaluación del efecto antimicrobiano de la cáscara de cacao en piezas dentales con caries.	Variedad Nacional	Cusco	Poma Choque EC. 2018. Título de Cirujano Dentista. Universidad Nacional Jorge Basadre Grohmann-Tacna
	Evaluación del efecto antibacteriano de las hojas de cacao sobre *Escherichia coli* enterohemorrágica	Cacao de Batán Grande Chiclayo	Lambayeque	Montenegro Maldonado MO., Segura Cotrina Y. 2021. Título de Químico Farmacéutico. Universidad Roosevelt.
Cosmetics	Formulación de una crema dermo-cosmética de acción foto-protectora a base de semilla de cacao	Sin información	Sin información	Limas Pino PM. 2018. Título de Químico Farmacéutico. Universidad Nacional Mayor de San Marcos.
	Producción de jabón de tocador con manteca de cacao y aceite esencial de hierba luisa.	CCN-51	Ucayali	Nunjar Aliaga DA. 2020. Título de Ingeniero Agroindustrial. Universidad Nacional de Ucayali.
Industrial biotechnology	Obtención de pectinas para la elaboración de empaques alimentarios biodegradables.	CCN-51	Ucayali	Del Águila Flores D., Zegarra Jumanga DA. 2016. Título de Ingeniero Agroindustrial. Universidad Nacional Intercultural de la Amazonía.

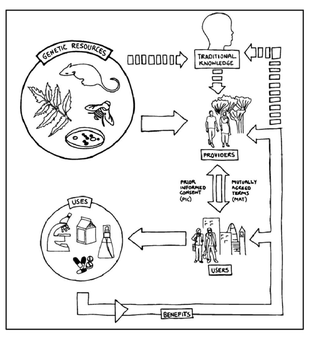
LOST OPPORTUNITIES AND CHALLENGES IN THE CONTEXT OF ACCESS & BENEFIT-SHARING FROM GENETIC RESOURCES OF COCOA

- There are molecules contained into the cocoa grain with many useful applications, such as functional food, cosmetics, pharmaceutical products, that are sold as raw material or that are lost as waste in the productive chain.
- While cocoa is sold as a raw material, the price will always be less than the cost of the benefits than its genetic and biochemical components (derivatives) provide, as well as the cost of the conservation of the cocoa agroecosystem and its services.
- A national system of cocoa germplasm is needed to conserve the most common types of cocoa of the country, as well as the unique and local ones.
- This national management system of cocoa germplasm must recognize and incorporate the work farm collections established by the producers, through their traditional knowledge, selecting and concentrating the best local specimens in clonal gardens and seed gardens.

Juan Laura, the Peruvian Chocolate Farmer

INCOME FOR COCOA PRODUCERS IN THE CONTEXT OF ACCESS & BENEFIT-SHARING FROM GENETIC RESOURCES OF COCOA

- The ABS system opens the opportunity to negotiate contracts in which benefits can be established for producers who provide the genetic material of cocoa for commercial and non-commercial use.
- None of the listed academic research has passed through the country's ABS system, the knowledge generated has been released and with it the opportunity has been lost
- The ABSCH, platform of information of the Nagoya Protocol, register four contracts of access to genetic resources of cocoa: two for commercial use and two for non commercial use.
- Based on the information given by the user and/or the provider (producer) of the genetic material of cocoa, in one contract the benefits agreed are similar to those considered in a common research project that does not require going through the access system; and in another one, there is a substantial monetary benefit for the producer.



Pastor-Soplín, Santiago[1]; Velásquez, Dora[2]; Rivas, Emma[3]
[1] Carrera Ingeniería Agroforestal, Universidad Científica del Sur. Lima, Perú. spastor@cientifica.edu.pe
[2] Investigadora independiente, doravelasquezmilla@gmail.com
[3] Investigadora independiente, l.rivaseoane@gmail.com