

Technological innovation in Andean cacao

It is necessary to establish technological innovations for cocoa producers in Andean areas focused on improving cocoa bean quality during production and processing in order to access new markets



2700
Producers benefited

1000
Female producers trained

25
Appropriation of knowledge

10
Differentiated quality materials

6
Intervened areas

2
collection of microorganisms present in cocoa fermentation

5
Agtech

3
Training of human talent



¿What development and innovation required Andean cacao?

Initiative

Cocoa is an important source of income especially for small producers, however more research is required in order to generate practical solutions to meet market requirements. It is necessary to select differentiated materials by their organoleptic quality, agricultural practices that reduce the

presence of cadmium in the seed, improvements in the fermentation stage including the use of starter cultures, and include the encapsulation of the flavonoids present in the bean focused on the market of nutritional supplements, of high demand and greater benefit.

Improving the competitiveness of Andean cacao

Tech solution

The project seeked to close the gaps in Andean cocoa production with the producers, in order to generate technological improvements in: I) generation of a geographic information system of three producing areas for each country with an emphasis on edaphoclimatic variables that influence cocoa quality, II) identification of high quality regional materials that can be used for future planting processes, III) the analysis of the productive system and the

presence of cadmium in the soil, as well as possible practices that decrease the absorption of this metal IV) a prototype of an ecological fermenter with the application of starter microorganisms that improve performance and organoleptic quality, IV) the development of encapsulated prototype rich in flavonoids present in the seed, with the evaluation of the antioxidant activity V) knowledge transfer through virtual interactive conferences

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RECONOCIMIENTO DE MICROORGANISMOS & VALIDACION DE PROTOTIPO ECOLOGICO

Prototipo ecológico para fermentación ejecutado por Perú.

Tabla 1. Recuento de microorganismos indicadores de la calidad microbiana de fermentados de granos de cacao – Perú

Microorganismos	Unidad	Valor		
		F1	F2	F3
Coliformes totales	NMP/g	450	<3	<3
Coliformes fecales	NMP/g	9	<3	<3
Pseudomonas	NMP/g	<3	<3	<3
Aerobios mesófilos	UFC/g	7.8 x 10 ⁴	1.2 x 10 ⁵	6.7 x 10 ⁴
Anaerobios	UFC/g	6.8 x 10 ⁴	2.2 x 10 ⁵	2.4 x 10 ⁵
Esporangénicas	UFC/g	2.0 x 10 ⁴	1.9 x 10 ⁵	1.2 x 10 ⁵
Ácido lácticas	UFC/g	7.0 x 10 ⁴	9.8 x 10 ⁵	6.6 x 10 ⁵
Levaduras	UFC/g	1.4 x 10 ⁴	8.3 x 10 ⁵	8.2 x 10 ⁵

Prototipo ecológico para fermentación ejecutado por Colombia.

Tabla 2. Cuento de UFC en medios incubados en anaerobiosis y aerobiosis de granos de cacao – Colombia

		Fase de la fermentación					
Medio	Ambiente	M1	M2	M3	M4	M5	
Pulpa de cacao 50%	Aeróbico	3X10 ⁴	6X10 ⁵	8X10 ⁵	3X10 ⁴	5X10 ⁴	
Pulpa de cacao 50%	Anaeróbico	2X10 ⁴	3X10 ⁴	3X10 ⁵	3X10 ⁴	2X10 ⁴	

MORE INFO



Impacts and Results

A geographic information system was generated with the selection of differentiated quality materials, at least two for each country. At the nursery level, it was found that clone CCN 51 is characterized by a greater tolerance to the presence of cadmium in soils. Likewise, it was confirmed that soil remediation applying dolomite lime plus mycorrhiza reduces the presence of cadmium in the leaves, a technological improvement. For the fermentation stage there is a bank

of isolated microorganisms with species such as yeast and lactic acid bacteria. Likewise, two ecological prototypes for fermentation were validated, which stand out for their isolation system with recycled tyres. An encapsulation process for cocoa flavonoids was standardized, this product is characterized by their high antioxidant capacity. Finally, results have been shared through participation in congresses, explanatory videos, and virtual conference cycles.