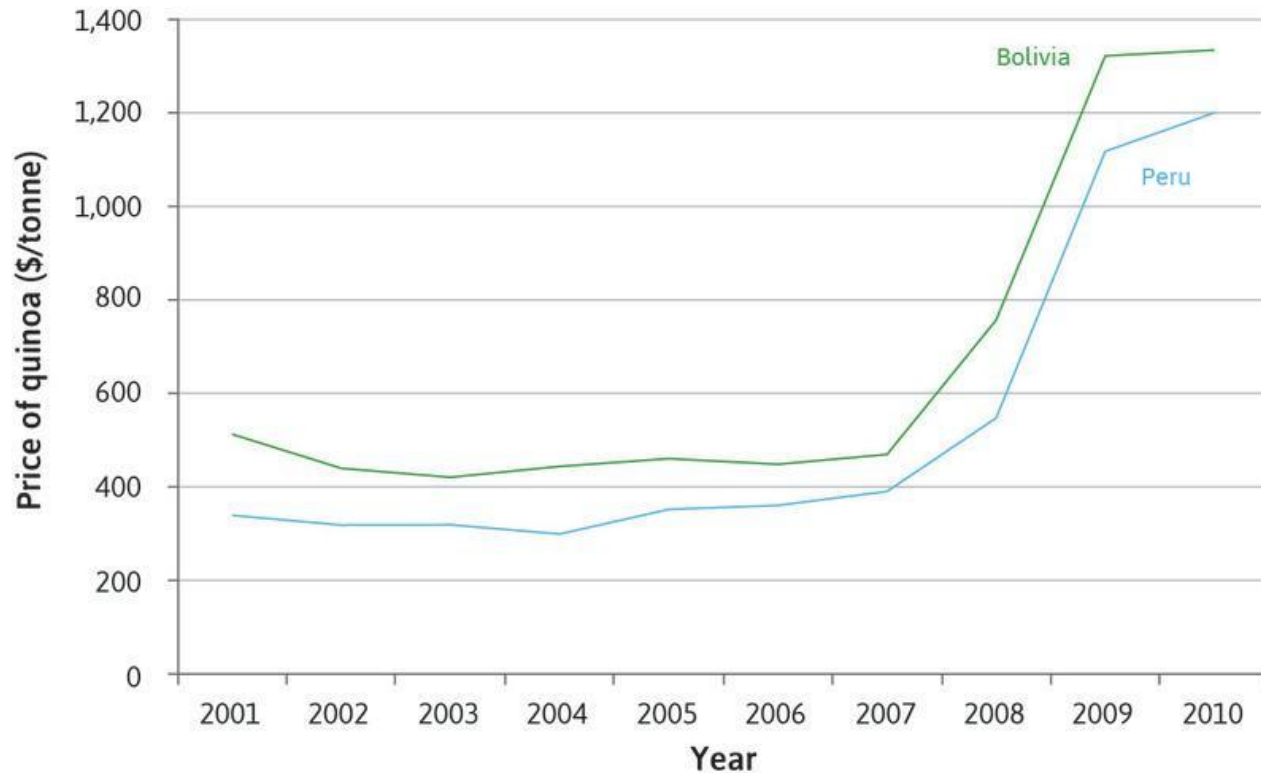


# Some advances for CLCA systems in Bolivia

Santiago Lopez Ridaura (CIMMYT)

April 2019

## Quinoa Boom. Increased demand and price, area expansion



As consequence:

**Llama production decreased** (low productivity, high labor demand)  
breaking the crop-livestock equilibrium

**Soil degradation** (no manure, shortened fallows)



# CLCA project aligned with PRO-CAMELIDOS IFAD program

(Integral Strengthening Program for the Camelid Value Chain in the Bolivian High Plateau (Pro-Camélidos) (2015-2022) 38.7 M USD,

Pro-Camélidos will address challenges such as low productivity, limited availability of feed and water, low value-added of raw material and lack of access to services.





# QUINOA

Poor agronomic  
management



low productivity  
soil degradation



# LLAMA

Extensive  
management  
(wool and meat)



low productivity  
soil degradation



## Key activities CLCA Y1 (2018-2019):

Stakeholder analysis for improving and scaling quinoa-llama crop-livestock system

Fuzzy cognitive mapping to understand the interrelationships in the quinoa-llama crop-livestock system

Farm household typologies to understand farming systems diversity

Developing and testing alternatives to improve the quinoa-llama crop-livestock system

- Rotations with leguminous and Improved fallows

- Improved pastures

- Wind barriers

- Manure composting

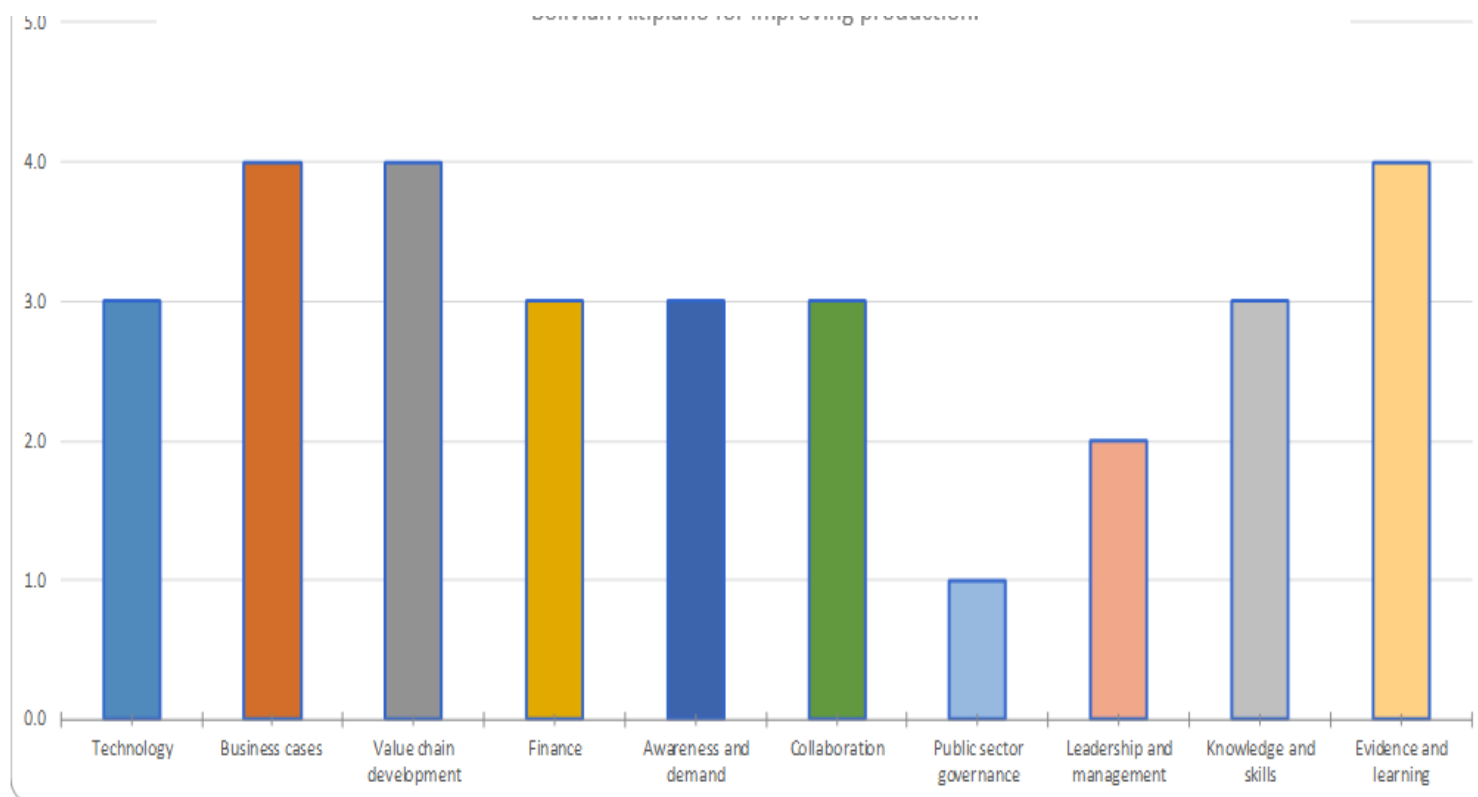




# Identification of key stakeholders and their role on scaling CLCA alternatives

Name	Type of organization	Incentive to scale	Form of collaboration	Role in CLCA
<i>International Maize and Wheat Improvement Center (CIMMYT)</i>	CGIAR	Core mandate is to reach impact with agricultural innovations among poor.	Contract with ICARDA for implementation CLCA in Latin America	- Scale CLCA for enhanced water use efficiency, soil fertility and productivity - Lead CLCA-Bolivia Project
<i>International Center for Agricultural Research in the Dry Areas (ICARDA)</i>	CGIAR	Core mandate is to reach impact with agricultural innovations among poor.	Contract for project implementation	- Overall lead CLCA - Knowledge exchange across continents
<i>International Fund for Agricultural Development (IFAD)</i>	Donor	Core mandate is to alleviate poverty in poor countries.	Contractor to consortium ICARDA- CIMMYT	Advocacy, convening partners, financing, organizational support, client.
<i>Ministerio de Desarrollo Rural y Tierras (MDRyT)</i>	Government (Host)	Mandated to lead rural development in Bolivia. Government of Bolivia interested to maintain market share for quinoa globally.	Contract with IFAD for implementation Pro-Camélidos	Through Pro-Camélidos only.
- <i>Programa de Fortalecimiento Integral del Complejo Camélidos en el Altiplano (PRO-CAMÉLIDOS, 2017-2022)</i>	Implementation program by MDRyT	Program aims to reduce rural poverty and child malnutrition, increase the incomes of rural families, and promote practices that are conducive to sustainable natural resource management.	Tbd	Hosts CIMMYT contribution in Bolivia. Organizational support to implementation CLCA.
- <i>Instituto Nacional de Innovación Agropecuaria y Forestal (INIAF)</i>	Innovation institute of MDRyT	Regulator and implementer of innovations in agriculture (seed certification, etc) within MDRyT mandate	Informal	Raise awareness with extension agents and public sector.
- <i>Centro Internacional de la Quinua (CIQ)</i>	Research institute of MDRyT	Promote the production and consumption of quinoa as a strategic resource to fight against poverty, hunger and malnutrition.	Tbd	Research and knowledge exchange
<i>Food and Agricultural Organization of the United Nations (FAO)</i>	Intergovernmental org.	Mandated by UN to lead international efforts to defeat hunger.	Informal	Knowledge exchange, convening/ convincing power, network
<i>Fundación PROINPA</i>	Semi-private foundation	Promotes the conservation and sustainable use of natural resources, sovereignty and food security, and the competitiveness of agricultural products for the benefit of producers, the agricultural sector and society as a whole through research and technological innovation.	Service contract for research on local adapted CLCA	Research and development implementation partner.
<i>UMSA university</i>	Public University	Apply research and develop students skills and knowledge.	Service contract for research on local adapted CA	Capacity building through students in collaboration with PROINPA
<i>Indomita- marketing experts</i>	Private sector	No intrinsic motivation to scale CLCA. Service provision along scaling pathway.	Service contract	Raise awareness with farmers, value chain actors and political level on soil degradation and CLCA methods
<i>Centro de Promoción de Tecnologías Sostenibles (CPTS)</i>	Non-profit organization	Promotes use of more efficient technologies.	TBD	<a href="#">Knowledge exchange-</a>
<i>Bolivian Chamber of Quinoa Royal and Organic Products Exporters (CABOLQUI)</i>	Non-profit organization	Aims to develop all the active participants in the quinoa chain and other organic products by promoting organic production, social and environmental responsibility and the development of small farmers.	TBD	Knowledge exchange, convening/ convincing power, network
<i>Andean Valley Corporation.</i>	Bolivian company	Dedicated to producing, processing and exporting organic food, made with Organic Royal Quinoa.	TBD	Knowledge exchange, (export) market outlet, promotion of CLCA practices
<i>Taller de Investigación y Mecánica de Tecnología Agrícola Andina (TIMTAA)</i>	Private sector	Promotion and sale of local and sustainable machinery.	TBD	Machinery service providers
<i>Asociación de Instituciones Financiera de Desarrollo (FINRURAL)</i>	Non-profit organization	Represent and provide comprehensive services to socially responsible financial institutions for the fulfillment of their objectives, in addition to supporting organizations that promote development with a social vision.	TBD	Expertise on finance for farmers, and finance for scaling
<i>Fundación PROFIN</i>	Non-profit organization	Seeking the articulation between financial and non-financial services to improve productivity, income and employment of small producers and small and medium enterprises in rural areas	TBD	Expertise on finance for farmers, and finance for scaling
<i>ReverdeSer/Heifer</i>	Non-profit organization	Promotion and scale of conservation agriculture principles.	TBD	Research and knowledge exchange. Raise awareness among farmers.

## Stakeholder's views on scaling ingredients for scaling CLCA alternatives



Public sector governance and leadership/management as main limiting ingredients

Available technologies, knowledge and skills, awareness and demand, finance mechanisms and collaboration needs improvement





Stakeholders with different levels of interest and power for change need to collaborate

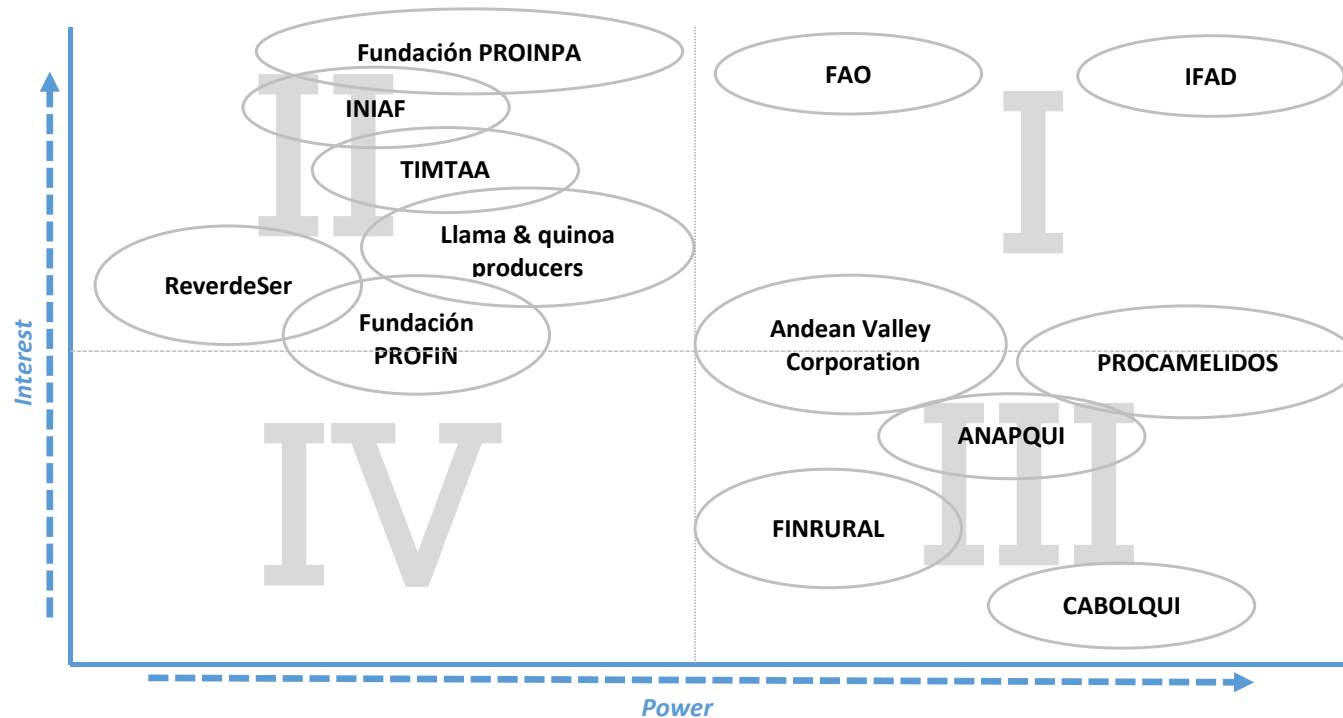


Figure 1. Stakeholder analysis for the quinoa-llama systems.

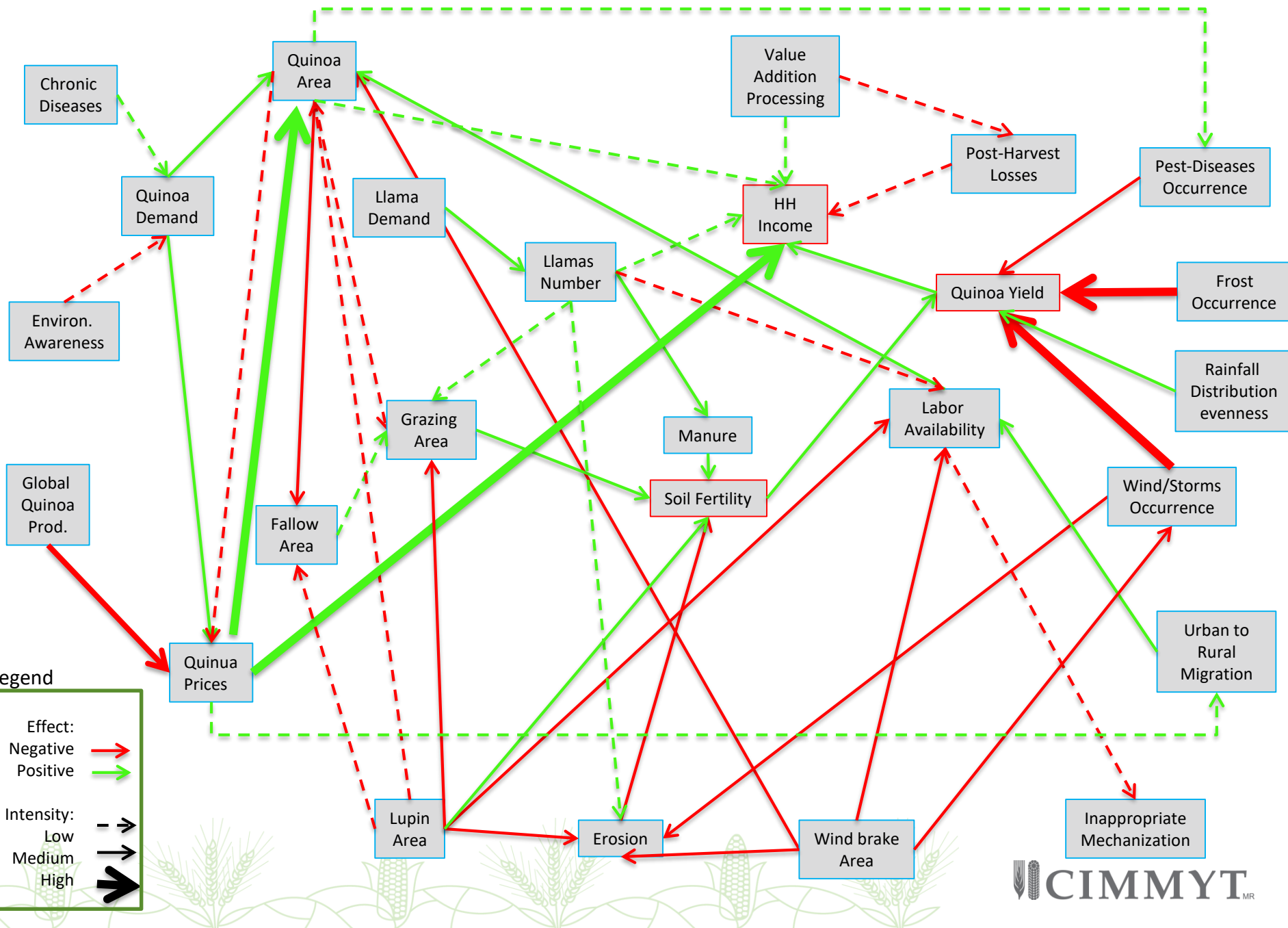


## SOME IMPORTANT FINDINGS WITH STAKEHOLDERS

- Soil degradation in the Altiplano is recognized as a major threat to smallholder livelihoods (lack of alternatives for quinoa-llama farmers) and the global quinoa market position (quantity and quality of Quinoa Real)
- The willingness and promising opportunities exist from a range of sectors to move to a more sustainable production system; however, this is pursued in isolation or in camps (public and private).
- There is not a lot of experience with Conservation Agriculture for Quinoa- Llama systems, hence it is important to get an overview of the current status first, and then to test and introduce a new way of doing CA.
- It is clear though that crop residues are not available in enough quantities, tillage is used as a way to “harvest” water and there is not much scope for diversification due to hard environmental conditions.



# Fuzzy Cognitive Map of Quinoa Production Interacting Factors



# FARM HOUSEHOLD TYPOLOGIES

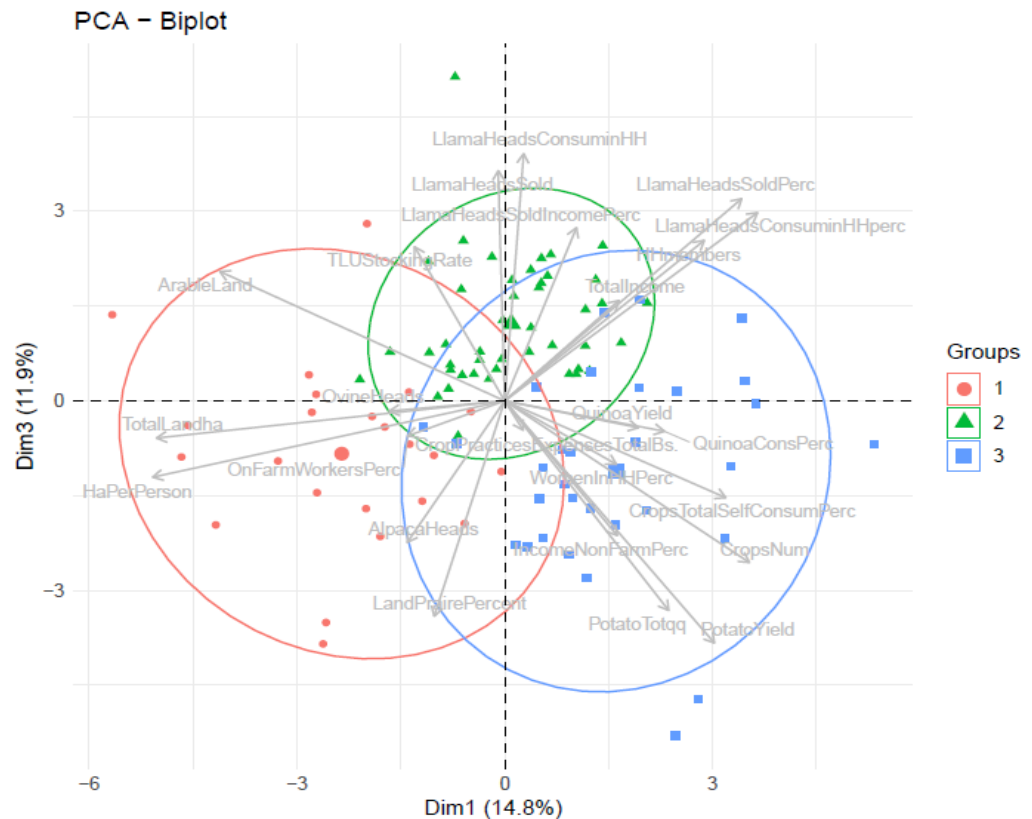
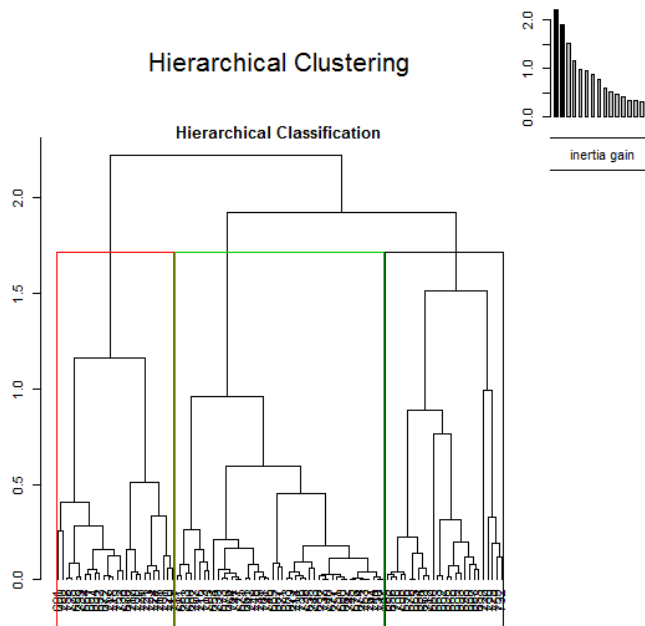
- 1) Multivariate analysis of Pro-Camelidos baseline survey data
- 2) Principal component analysis and hierarchical clustering
- 3) Main variables included related to resources (land, herd size) and income/livelihood sources
- 4) First developed for two municipalities where CA technologies are developed and tested
- 5) Followed by three municipalities upon request of Pro-Camelidos





# FARM HOUSEHOLD TYPOLOGIES (example 1)

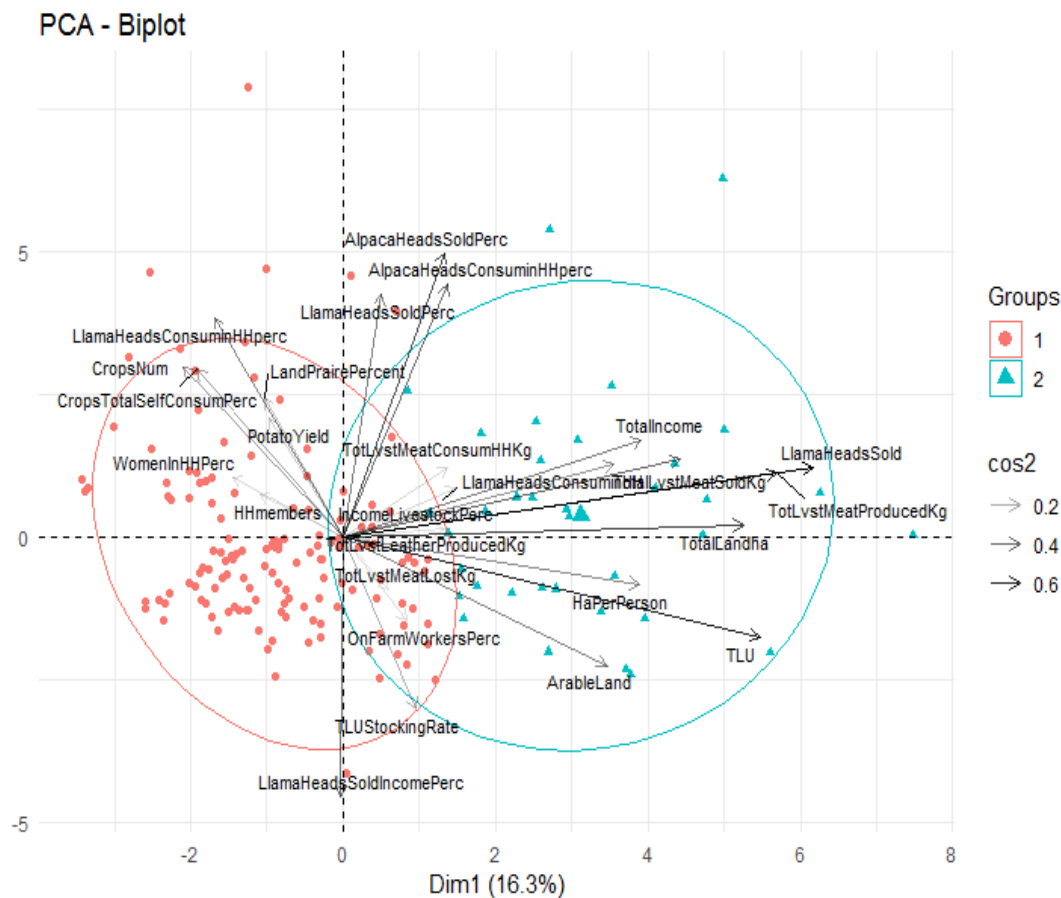
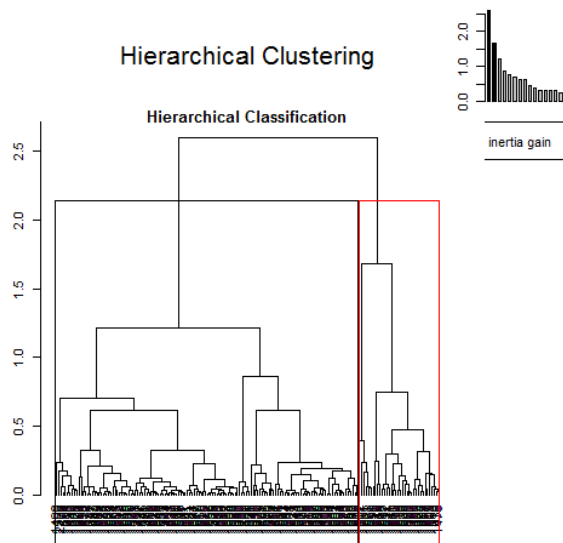
## Typology Challapata Municipality



- 1) Low income farms of diversified livestock, large land holdings and off-farm activities.
- 2) Commercial farms based on llama trading with intermediate incomes and smaller land holdings, with significant income generated off-farm.
- 3) High off-farm income farms, with livestock and crops for self-consumption.

# FARM HOUSEHOLD TYPOLOGIES (example 2)

## Typology Turco Municipality



Type 1 (22%) Livestock oriented farmers with low income and off farm activities

Type 2 (78%) Large scale livestock oriented farmers with large herds and high income

# DEVELOPING AND TESTING TECHNICAL ALTERNATIVES

## Main achievements:

3.8 Ha improved fallow established with native leguminous (*Lupinus* sp.)

2.5 Ha under green-manure with native leguminous (*Lupinus* sp.)

30 kg of seed of native leguminous (*Lupinus* sp.) collected

6.4 Ha established with native pastures

19 m<sup>3</sup> of manure composted

11 000 seedlings for wind barriers

4 500 meters of wind barriers established

Field days with farmers and other actors to share experiences

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