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Managing Water Scarcity in River Basins: Innovation and Sustainable Development

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Scaling up quinoa value chain to improve food and nutritional security in poor rural communities of Morocco

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Problems and Challenges

Main problems are:

- Rural poverty remains a challenge in Morocco, with about 14.7% of the population estimated to be living on less than US$2 a day (HCP, 2010).
- Water resources in Morocco are becoming scarcer – a situation aggravated by the effects of climate change, erratic rainfall and a succession of drought years.
- In Rehamna region there is a need to replace cactus crop (which was completely devasted by cochineal insect) with an alternative crop as quinoa

Key challenges are:

- Limited availability of genetic material for cultivation outside its indigenous environment
- Limited knowledge of the best crop management practices –
- Little awareness about quinoa's nutritional benefits and the intricacy to incorporate it into local diets in regions outside the Andes
- Lack of suitable marketing channels where the farming communities could sell their produce

Project objectives

Scale up the business model to enable the production and consumption of quinoa on a large scale

Upgrade the existing value chain and develop a viable business model

Conceptual framework

Expected impacts

1000 farmers and women will benefit from the project

200 farmers and women will benefit from the project

WP 1: Diagnose

1.1. Determine gaps and weaknesses in the existing quinoa value chain

1.2. Identify opportunities for quinoa value chain development

1.3. Identify quinoa value chain actors

1.4. Identify upgrading strategies and develop a plan to address the identified gaps/weaknesses to enhance the existing value chain business model in Rehamna.

WP2: Upgrade

2.1. Introduce high yielding cultivars and best practices for optimal productivity

2.2. Register introduced high yielding cultivars in the national germplasm catalogue

2.3. Develop quinoa based products that fit within the Moroccan context

2.4. Upgrade production and quinoa processing cooperatives (Develop best practices and introduce technologies)

2.5. Develop certifications (Organic, HACCP) for project supported beneficiaries (production and processing cooperatives)

2.6. Assess the demand for quinoa product and develop marketing and pricing strategy

2.7. Assess the impacts and performance of the upgraded business model and develop scaling up strategy.

WP3: Upscale

3.1. Establish seed production system

3.2. Generate demand for quinoa products

3.3. Create a conducive policy environment for a national quinoa program

WP4: Exchange

4.1. Establish linkages between value chain actors including governmental entities (DPA, ONCA, ONSSA, Province), farmers, women cooperatives and private (OCP, Start-up)

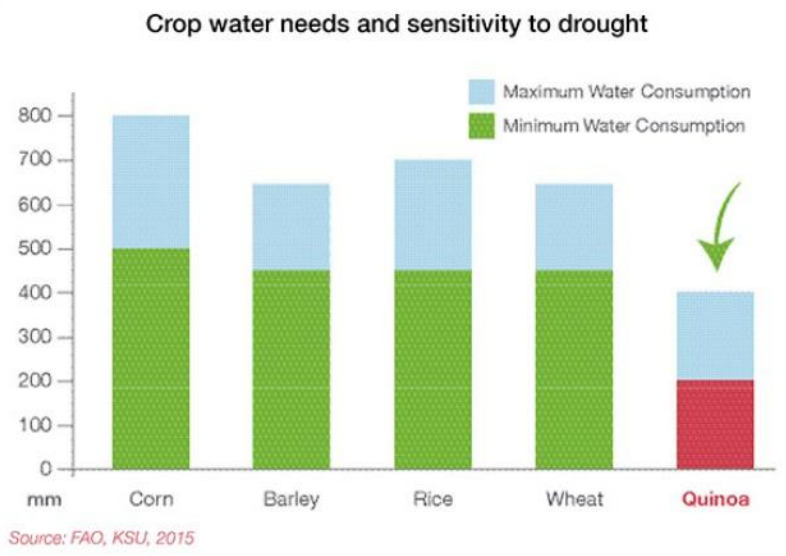
4.2. Develop and deliver training packages to all value chain actors (extension services, farmers, women cooperatives…etc)

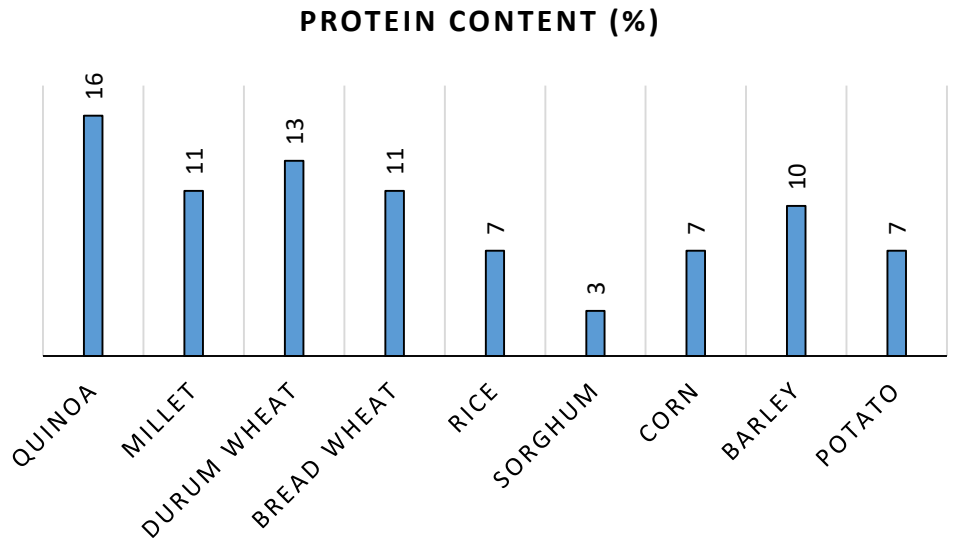
4.3. Generate awareness concerning quinoa and its benefits through dissemination of project results

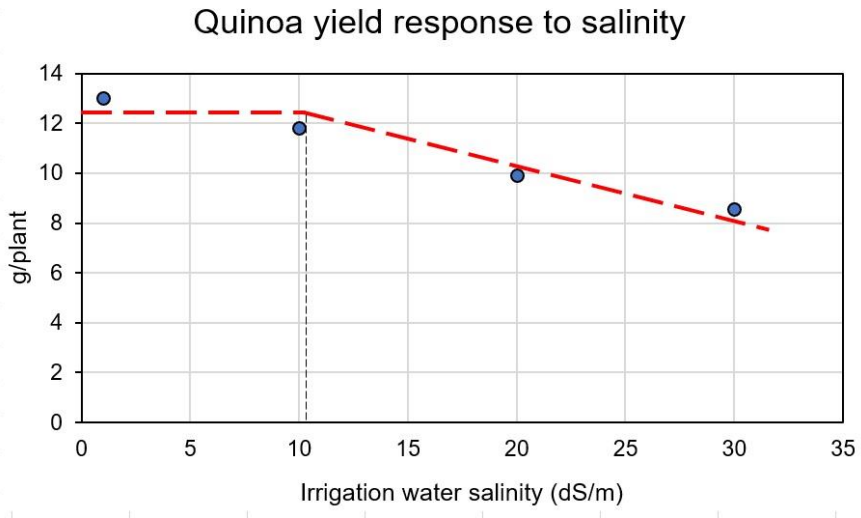
Why Quinoa

Line/Mineral (mg/100g)	ICBA Quinoa 1	ICBA Quinoa 3	ICBA Quinoa 4	ICBA Quinoa 5	Wheat
Na	56.38	72.61	60.15	62.04	5.0
K	163.15	1652.34	1534.36	1412.88	578.3
Ca	241.82	296.43	257.21	179.83	50.3
Mg	685.24	710.91	824.15	572.46	169.4
Fe	84.67	97.36	128.70	68.58	3.8
P	471.73	452.99	456.63	435.13	467.7
Cu	0.24	0.26	0.29	0.56	0.2
Zn	1.48	1.60	1.63	1.32	4.7

Source: ICBA, 2015







Quinoa Value chain in Rehamna

Strengths

At agronomic level
- The region of Rehamna has favorable soil and climate conditions for growing quinoa
- Farming know-how compatible with the quinoa cropping
- Agronomic traits associated with quinoa (tolerance to different stresses)
- Easily recoverable by-products (leaves, straw, saponin)
- Preferred by special consumers (gluten-free, relatively low sugar content).

At gastronomic level
- Rapidity of cooking
- Versatility of quinoa-based recipes
- Easy integration into local diet by its similarity to locally prepared dishes (soup with milk, boiled rice, couscous, bread ...)

Weaknesses

Upstream
- quinoa is not very widespread compared to potential
- Among those who adopted quinoa: there is a precarious producer organization
- Quinoa is labor intensive with very few mechanized operations
- Problem related to the establishment of quinoa at the farm level (germination problem)
- Availability of good quality seeds
- Sensitivity to diseases such as Mildew and weeds
- High post-harvest costs

Downstream
- Basic marketing circuit
- Lack of promotion and communication around quinoa products
- Price breakdown is not well structured,
- Poor product quality

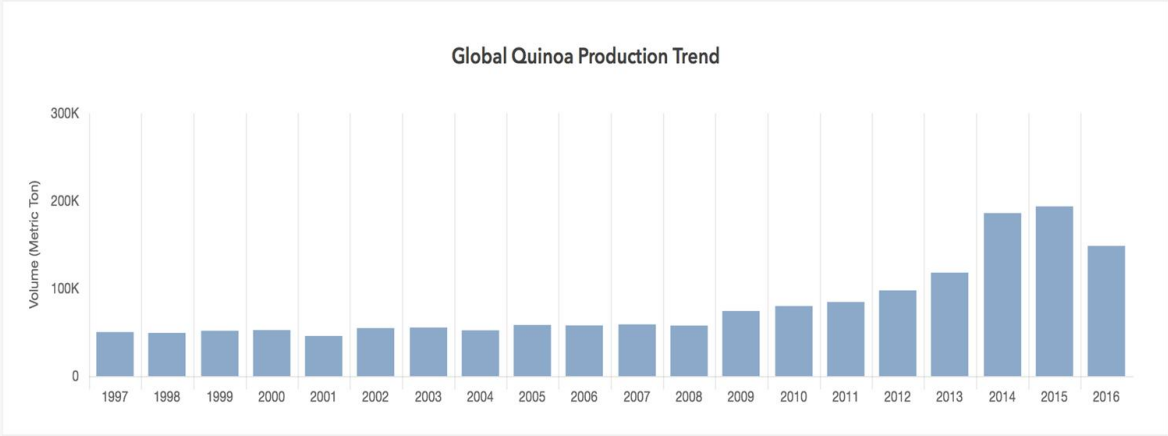
Opportunities

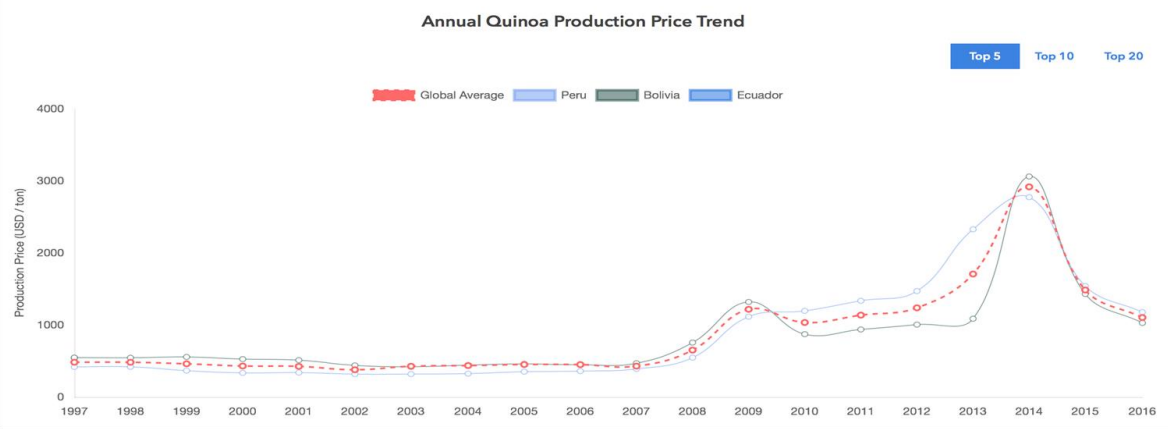
- Encouragement of alternative crops by the governoment (Green Morocco Plan, Pillar 2)
- Increasing interest of national and foreign researchers in farmers' adoption of quinoa
- Willingness of local development agencies (ONCA, DPA, NGOs) to promote and accelerate the process of adaptation and adoption of quinoa in the region
- Presence of agricultural fairs (SIAM, SIFEL, SIAL: promotion)
- Increasingly large consumer base
- Remunerative price and solvent consumers
- Possibility of opening on the export markets

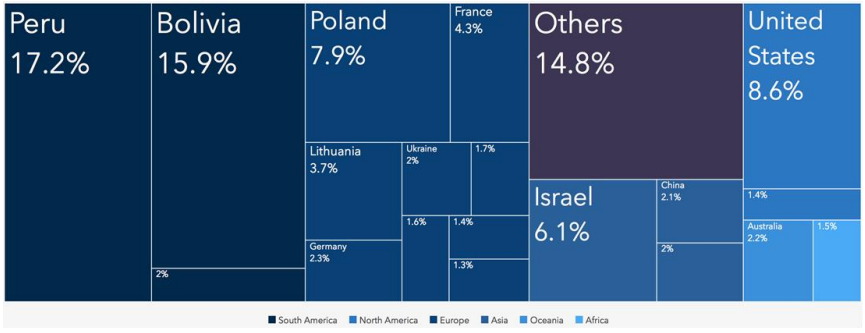
Threats

- Competitiveness with imported quinoa products;
- High cost and slow process of organic certification.
- Climatic variability (precipitation) especially in the rainfed areas
- Loss of varietal purity

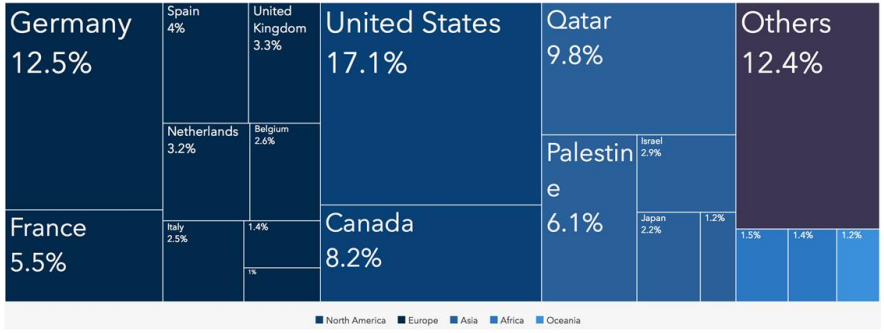
International Quinoa Market Aanalysis





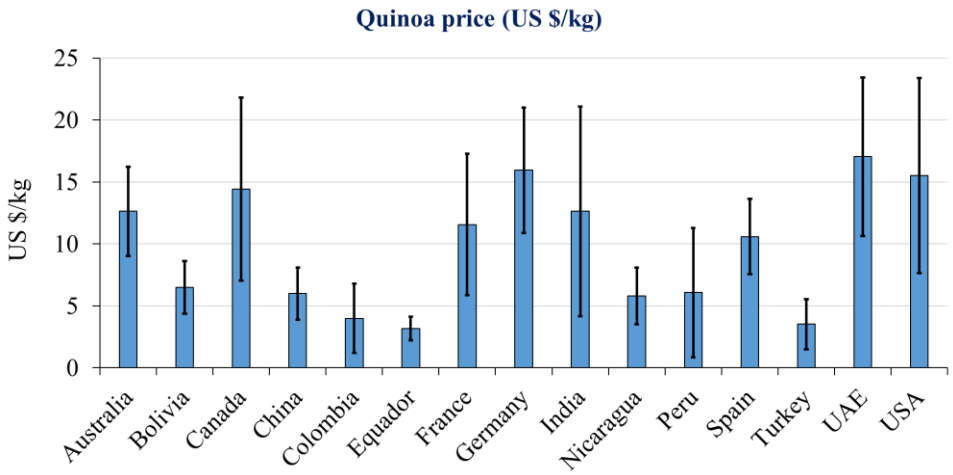


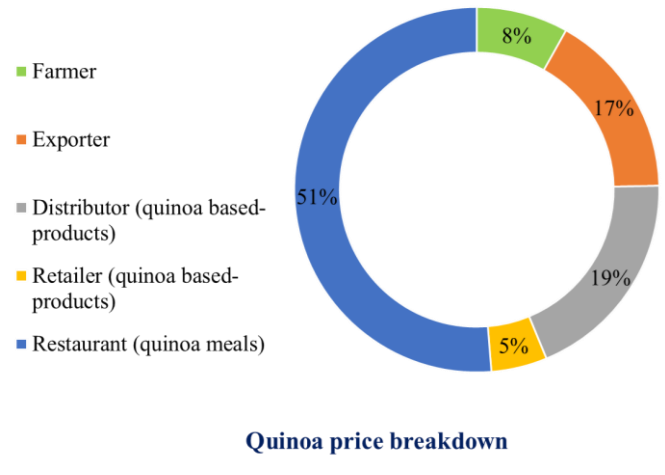
Quinoa top exporters

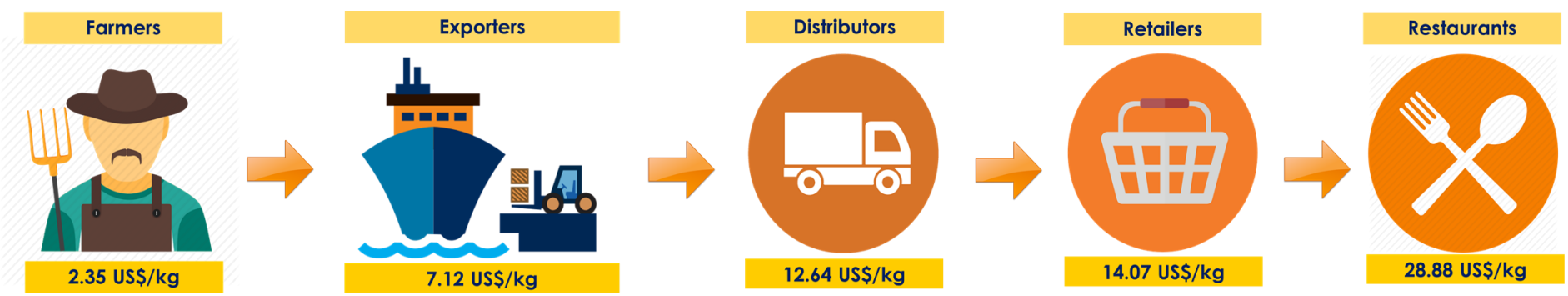


Quinoa top importers

International Quinoa Market Aanalysis







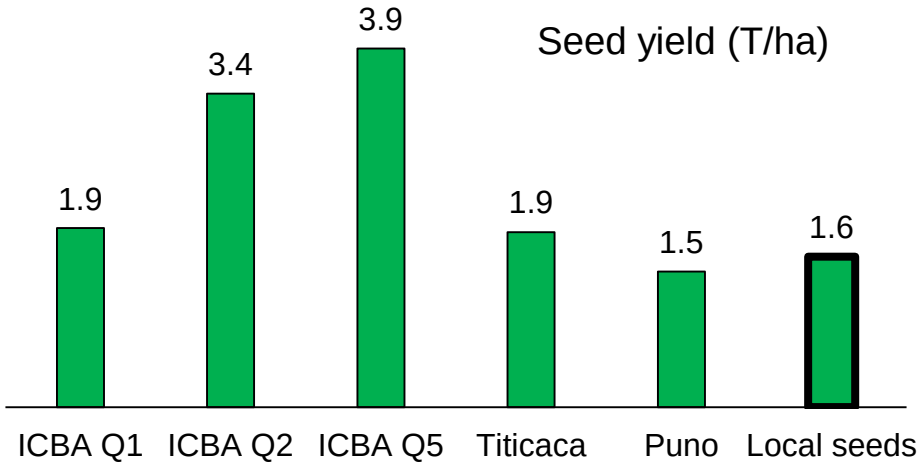
Quinoa price at different levels of the value chain

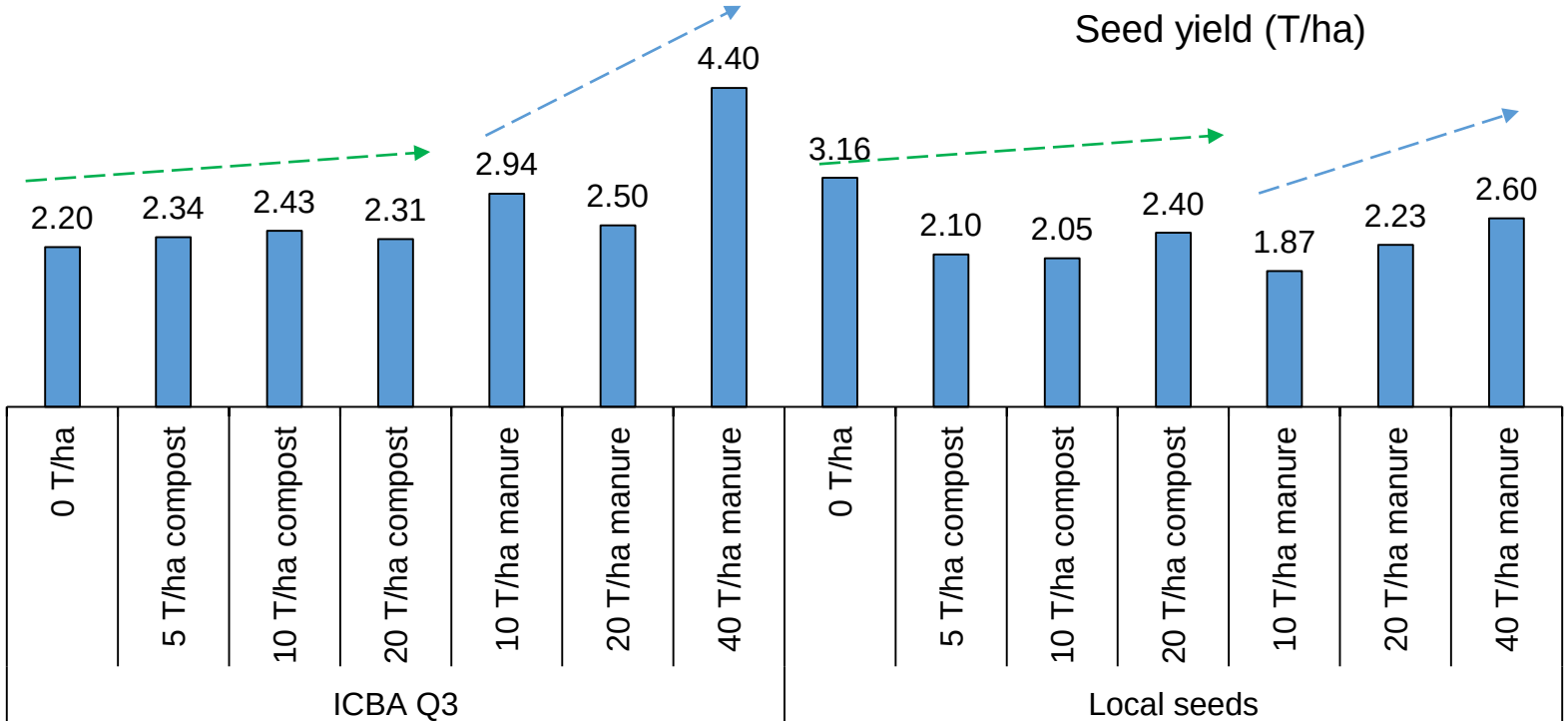
The pricing equation model using the linear regression model is the following:

Quinoa retailer price = 3.444 x **Income_growth** + 0.517 x **Urban_population_pct_of_total** + 0.1445 x **Agriculture_contribution_to_economy** - 0.2489 x Tax_revenue + 1.007e-12 x Total_income - 4.572 x Urban_population_growth

After applying the price model on Morocco data we found that processed grain quinoa estimated price in Morocco retailers should be **18.5 US $/kg** as per the collected worldwide data

Introduction trials results





Quinoa Certification

Farmers

COOP Women

Organic certification (Europe and Morocco regulation)

HACCP

Introduction des accessions performantes

Multiplication de semences

Production

Semis

Entretien de la culture

Moisson

Battage

Post-récolte

Nettoyage des graines

Lavage et elimination des saponins

Séchage

Triage des couleurs et calibre

Transformation

Marketing

Distribution

Consommation

Capacity building

- Importance of quinoa and best cropping practices
- Best pratcice of making traditional couscouss and other quinoa based products
- Organic farming: Principles, Certification and control





Conclusion

- There are a great interest expressed by farmers to adopt quinoa
- Need for marketing studies and activities to generate demand on quinoa products
- Good will of the governmental entities and related stakeholders to develop quinoa value chain
- Awareness campaigns on quinoa nutritional and agronomic importance are needed
- ICBA quinoa accessions showed very high performance compared to locally produced seed. Thus, a seed production system is required to preserve their genetic characteristics

Some Key indicators

Project completion

30%

Students involved

7

Official meeting conducted

7

New cultivars introduced

6

Surveyed farmers

318

Surveyed women

181

Conducted field trials

12

New technologies introduced

4

Trained farmers

80

Trained Women

50

Trained extension agents

30

Quinoa Rehamna

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Thanks for your attention

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