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Quinoa introduction in West-Africa: experience of Burkina Faso

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Introduction

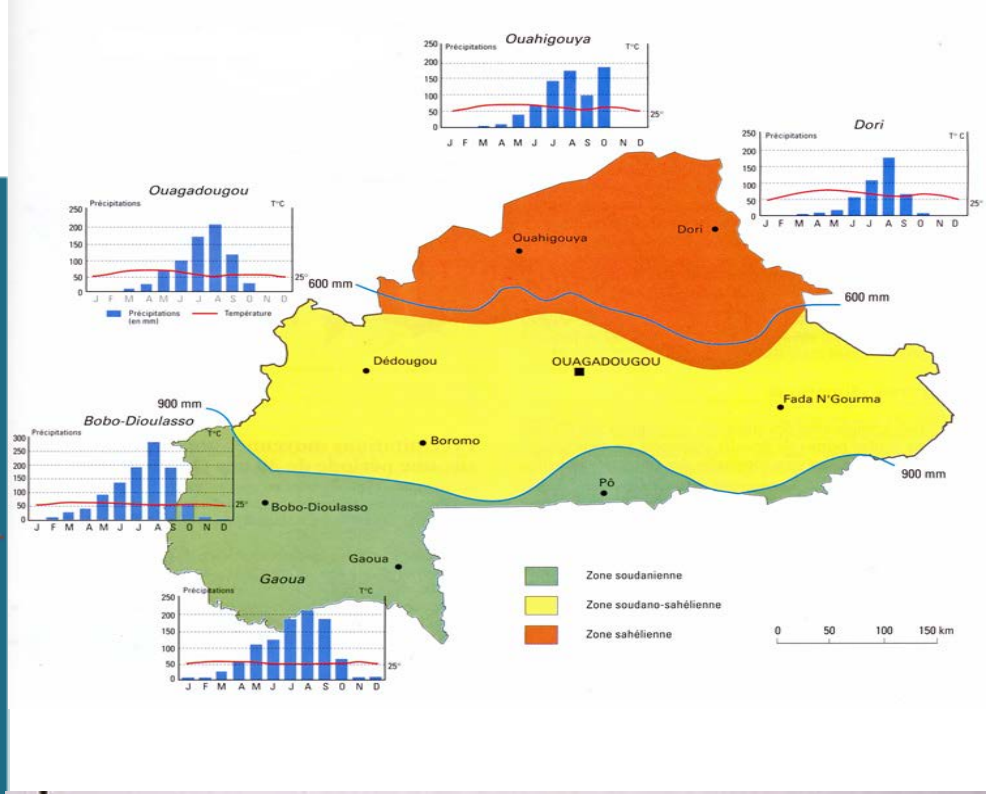
Quinoa worldwide development in 2013 (Bazile and Baudron, 2015)

Introduction

- UN Food and Agriculture Organization developed *Technical assistance for the strengthening of the Food system of Quinoa* project to introduce quinoa and promote its production and use as a staple food in Africa

- In West-Africa, the countries targeted were : Burkina Faso, Cameroun, Niger, Senegal, Chad, Togo and Ghana

BURKINA FASO



Population : 17 million

Land area: 105,869 mi²

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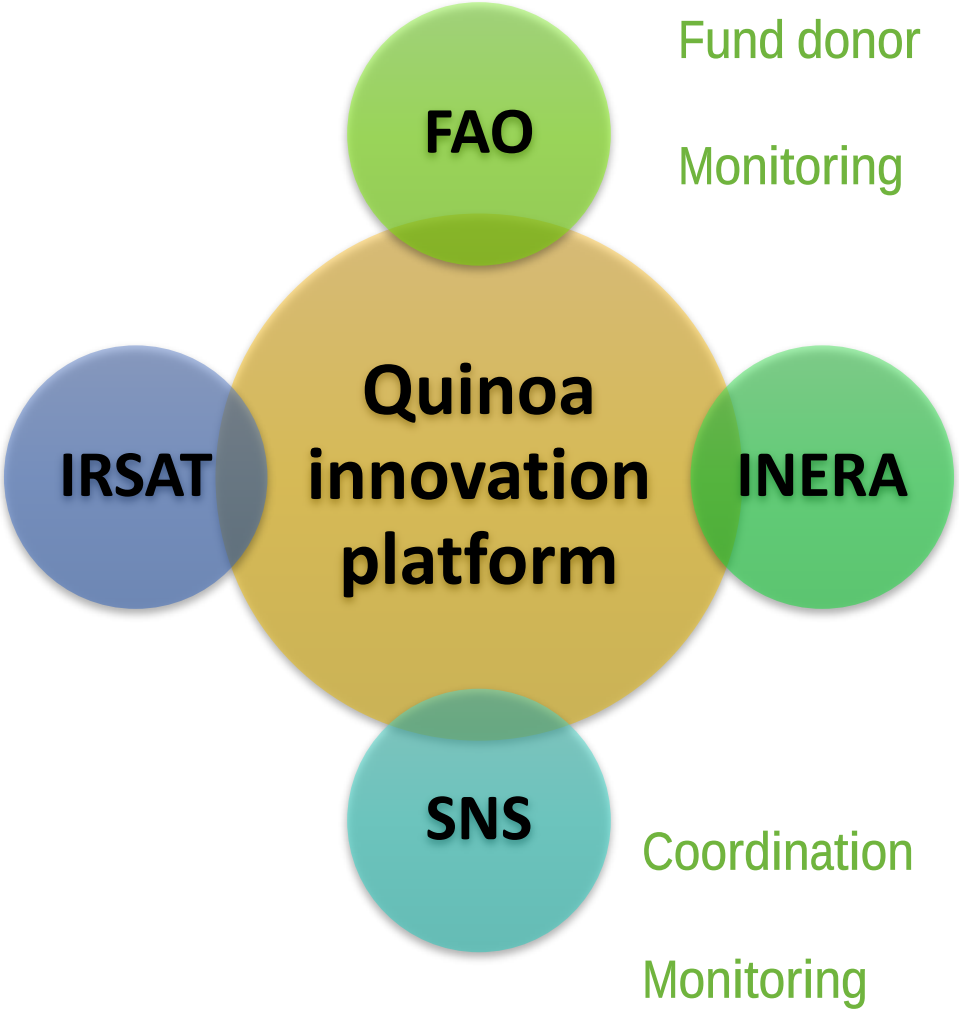
Introduction

- Quinoa, a nutritious cereal crop for millions of people throughout the Andes, could also play an important role in eradicating hunger, malnutrition and poverty in Burkina Faso
- With exceptional resistance to drought and poor soils, quinoa can successfully be grown in different agro-ecology zones of Burkina Faso
- Quinoa is a potential alternative export crop for Burkina Faso

Materials and Methods



Materials and Methods

MORPHOLOGICAL AND AGRONOMIC PERFORMANCE OF QUINOA

Quinoa cultivars introduced

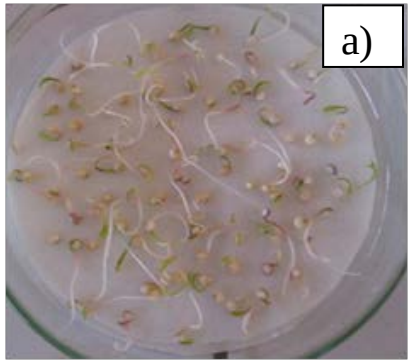
5 cultivars including *Blanca de junin, Amarilla Sacaca, Amarilla Marangani, Salecedo INIA, Kancolla* originated from Peru and 2 cultivars, *Puno* and *Titicaca*, obtained from University of Copenhague, Denmark were evaluated

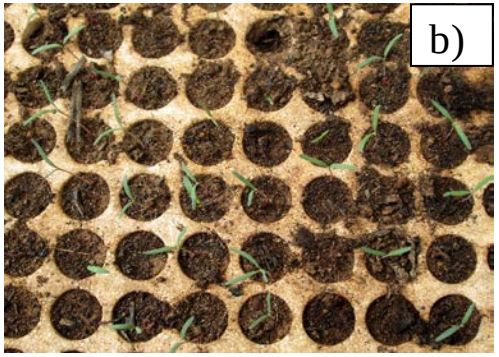
Seed quality

The seeds were assessed in the laboratory of INERA for the presence of pathogen agents (fungi, insects, etc)

Seed germination

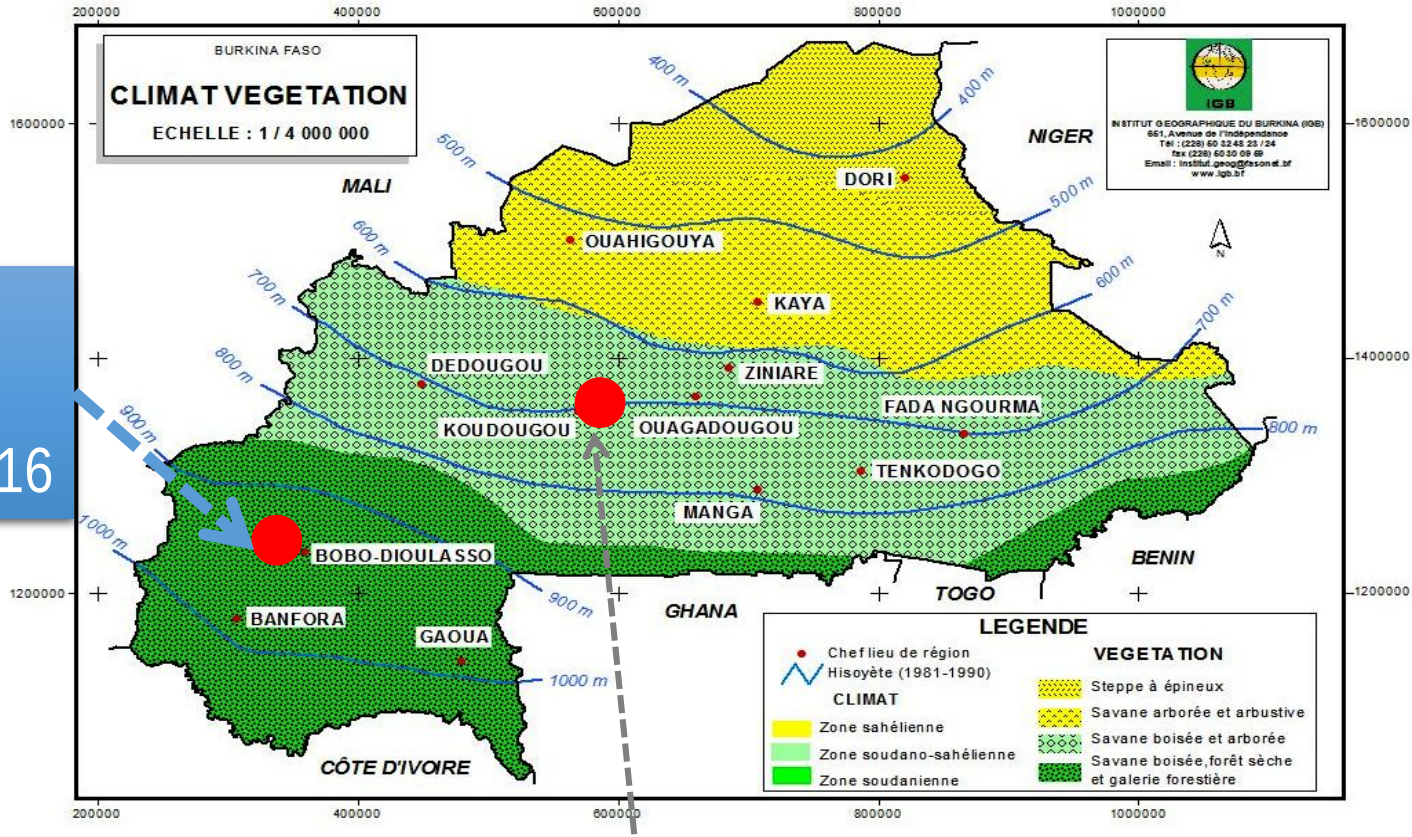
germination test was done with two substrates : a) blotting paper and b) soil





Experimental sites for field trials

- Rainy season 2015
- Off-season 2015/2016



- Off-season 2015/2016

Materials and Methods

ACCEPTABILITY OF QUINOA IN BURKINA FASO

IRSAT has developed local dishes with quinoa seeds

Quinoa grain processing

A sensory evaluation was done with 24 not trained consumers

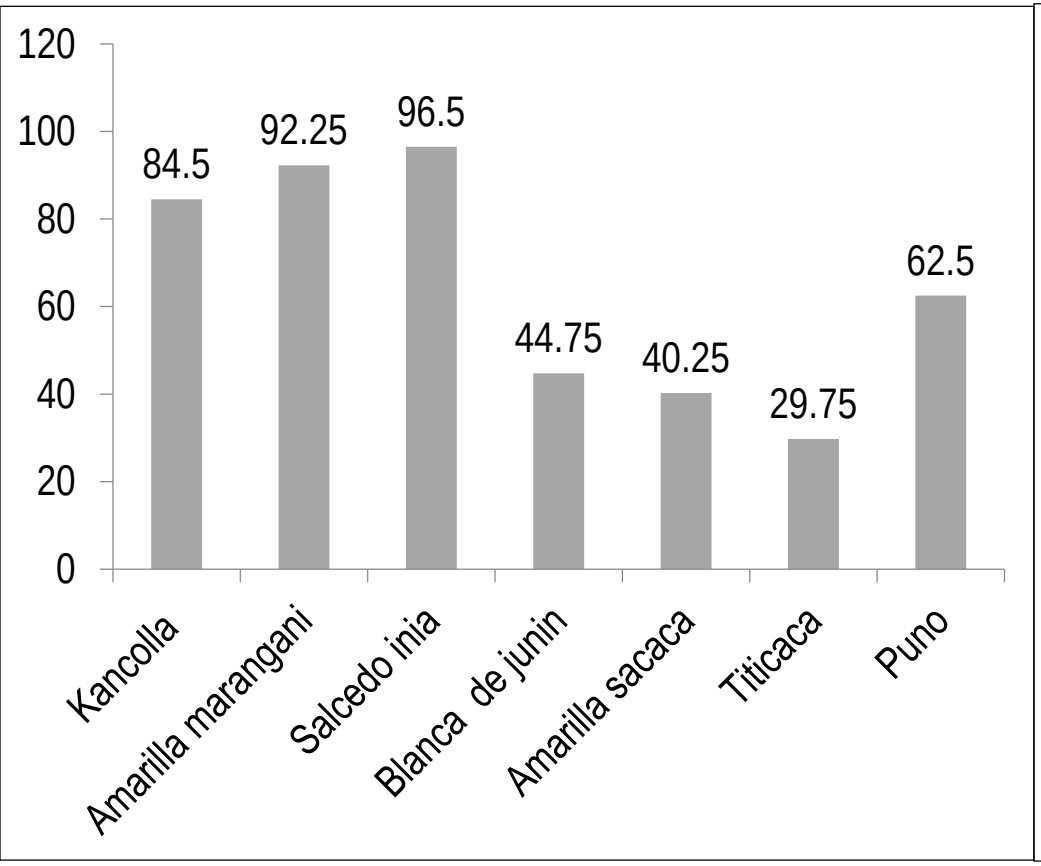
Results

Seed infestation by fungi

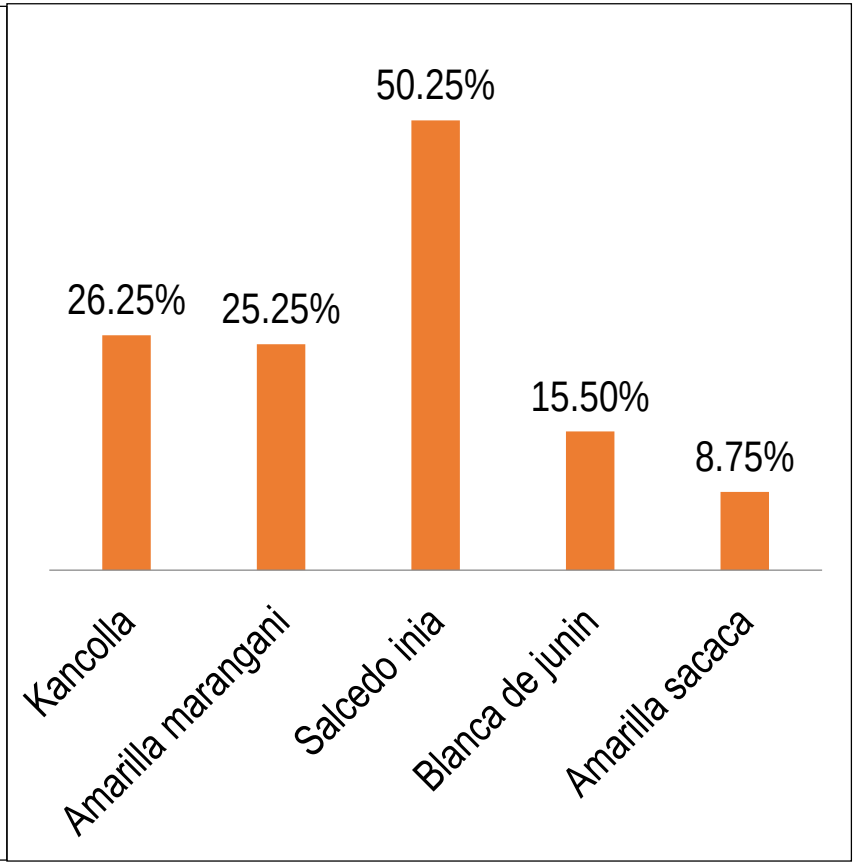
Champignon	Amarilla marangani	Amarilla sacaca	Blanca de junin	Salcedo inia	Kancolla	Titicaca	Puno	Total
Aspergillus spp	✓	✓	✓	✓	✓	✓	✓	7
Colletotrichum spp			✓		✓			2
Fusarium spp	✓	✓	✓	✓	✓	✓		6
Rhizoctonia spp	✓	✓	✓	✓	✓			5
Pyriculatia spp			✓	✓				2
Corynespora spp		✓	✓		✓			3
Ulocladium spp						✓		1
Total	3	4	6	4	5	3	1	

Results

Germination test



Paper substrate

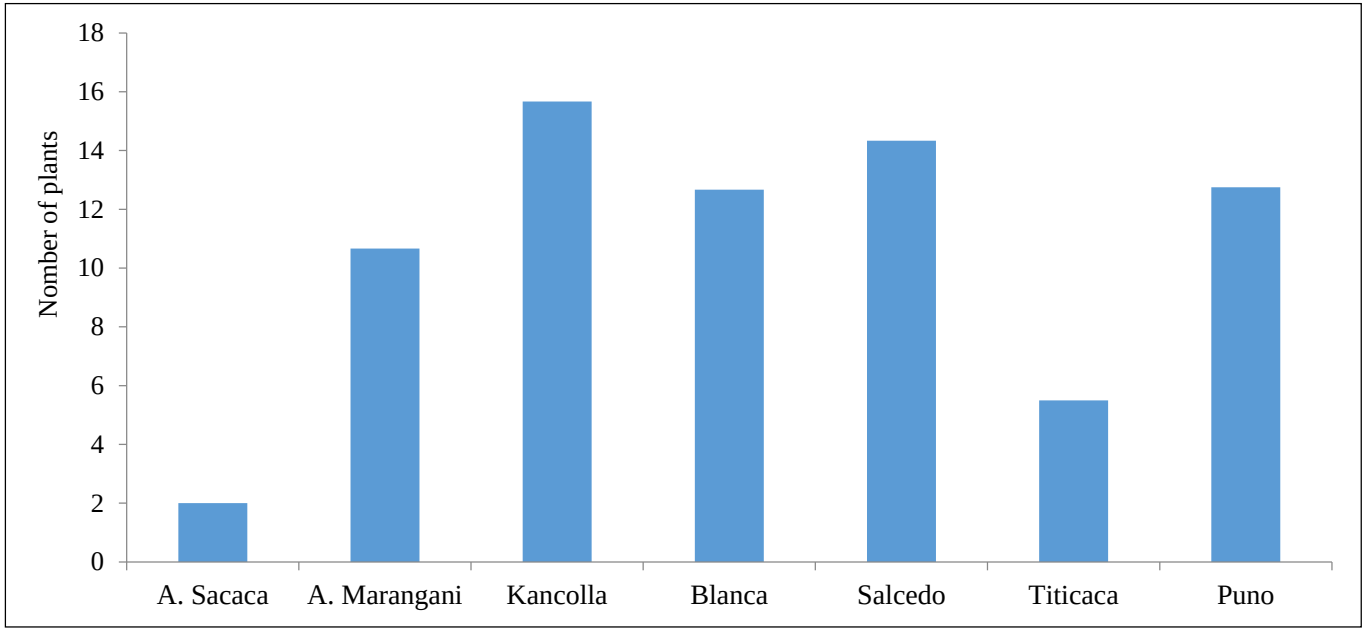


Sand/Organic growing media

Results

Evaluation in rainy season

Number of plant emerged was low



Average plant number across 3 replications in a RCBD

Cultivars were susceptible to lodging

Fungi diseases and pests were observed

Root and stem lodging

Pests (Lepidoptera) attack

Fungi diseases

Results

Evaluation in off-season

Plant emerged of the cultivars from Peru was very low, varied from 1 to 4 per repetition, so their data were not used

Table 1: average performance (mean ± s.e) of traits measured of *Titicaca* and *Puno*

Sites	**Saria**		**Farako-Bâ**	
Cultivars	**Titicaca**	**Puno**	**Titicaca**	**Puno**
Flowering (days)	73.33 ± 2.0	67.33 ± 0.3		
Maturity (days)	96 ± 0.0	91 ± 0.0		
Plant height (cm)	62.3 ± 4.9	71.73 ± 4.3	73.067 ± 2.7	62.2 ± 1.3
No. of branches per plant	15.2 ± 1.6	18.03 ± 0.5	14.133 ± 1.3	12.7 ± 0.2
Panicle width (cm)	6.27 ± 0.8	7.23 ± 0.7	5.193 ± 0.2	3.76 ± 0.9
Panicle length (cm)	23.6 ± 1.9	25.83 ± 1.9	32.117 ± 1.0	25.23 ± 0.7
grain yield per plant (g/plant)	26.31 ± 2.9	30.70 ± 4.8	27.063 ± 3.3	17.09 ± 1.8
1000 grains weight (g)	3.4	2.1	2	1.33
Total grains weight harvested (g)	751.1	2457.9	420.9	1567.1

Yield performance of both varieties were higher in Saria compared to Farako-Bâ

Results

Dishes from quinoa grain processing

Table 2: dishes developed with quinoa by IRSAT

No	Name of the Dishes	Main constituents
1	Gnongon	quinoa, millet, cowpea, groundnut
2	Crepe with quinoa[1]	quinoa, eggs, milk
3	Crepe with quinoa[2]	quinoa, rice, eggs, milk
4	Crepe with quinoa[3]	quinoa, rice, wheat, eggs, milk
5	Biscuit with coconut	quinoa, coconut, eggs, milk,
6	Biscuit	quinoa, eggs, milk
7	Quinoa yogurt	quinoa, yogurt
8	Quinoa degue	quinoa, millet, yogurt
9	Rice of quinoa	quinoa (eaten with a side-sauce)
10	Quinoa with lentils	quinoa, lentils
11	Fried quinoa	quinoa (prepared in a sauce)
12	Bean with quinoa	quinoa, bean
13	Tô of quinoa	quinoa (eaten with a side-sauce)

Gnongon with a side sauce

Crepe with quinoa

Results

Sensory evaluation

Table 3 : result of hedonic test with 9 dishes developed with quinoa seeds

Rank	Dish names	Very good	Good	Acceptable	Not appreciation
1	Crepe with quinoa	83.33	16.67	0.00	0.00
2	Gnongon	62.50	33.33	4.17	0.00
3	Quinoa with lentils	62.5	29.17	4.17	4.17
4	Quinoa yogurt	58.33	16.67	0.00	25.00
5	Quinoa degue	50.00	16.67	8.33	25.00
6	Quinoa biscuit with coconut	45.83	33.33	4.17	12.50
7	Rice of quinoa	25.00	54.17	4.17	16.67
8	Quinoa with tomato side-sauce	20.83	41.67	16.67	20.83
9	Quinoa biscuit	12.50	50.00	16.67	20.83

Results

Capacity building in quinoa production

Thirty (30) participants composed of extension agents, seed growers and famers received a training on quinoa production technique, harvest and post-harvest operations

Conclusions

- The production of quinoa is feasible in Burkina Faso if appropriate early-maturing cultivars, and agronomic practices to control weed and diseases are used
- Quinoa can be easily process to some of the local dishes which are appreciated, population is likely to adopt quinoa although others factors influencing the adoption like socioeconomic factors need to be considered
- Agribusiness opportunities and market-oriented development for quinoa in Burkina Faso need to be explored
- Forum for Scientific Research and Technological Innovations (FRSIT), November 19-26, 2016, helped to raise public awareness on quinoa

President of Burkina Faso visiting quinoa exhibition during the FRSIT

Acknowledgment

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