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Food and Agriculture Organization of the United Nations

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Quinoa for Future Food and Nutrition Security in Marginal Environments

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Adaptation of Quinoa for Food Security in the Himalayan Kingdom of Bhutan

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Where is Bhutan?

COUNTRY PROFILE

Small land locked country in the Himalayas.

Total land area of 38,394 square kilometers

Land use dominated by Forest Cover - 70.46%.

Arable area - 2.93%.

Bhutan pursues a unique development philosophy of Gross National Happiness

Agriculture and **Forestry** provides employment to **56.7%** of the population.

National food self-sufficiency -50%

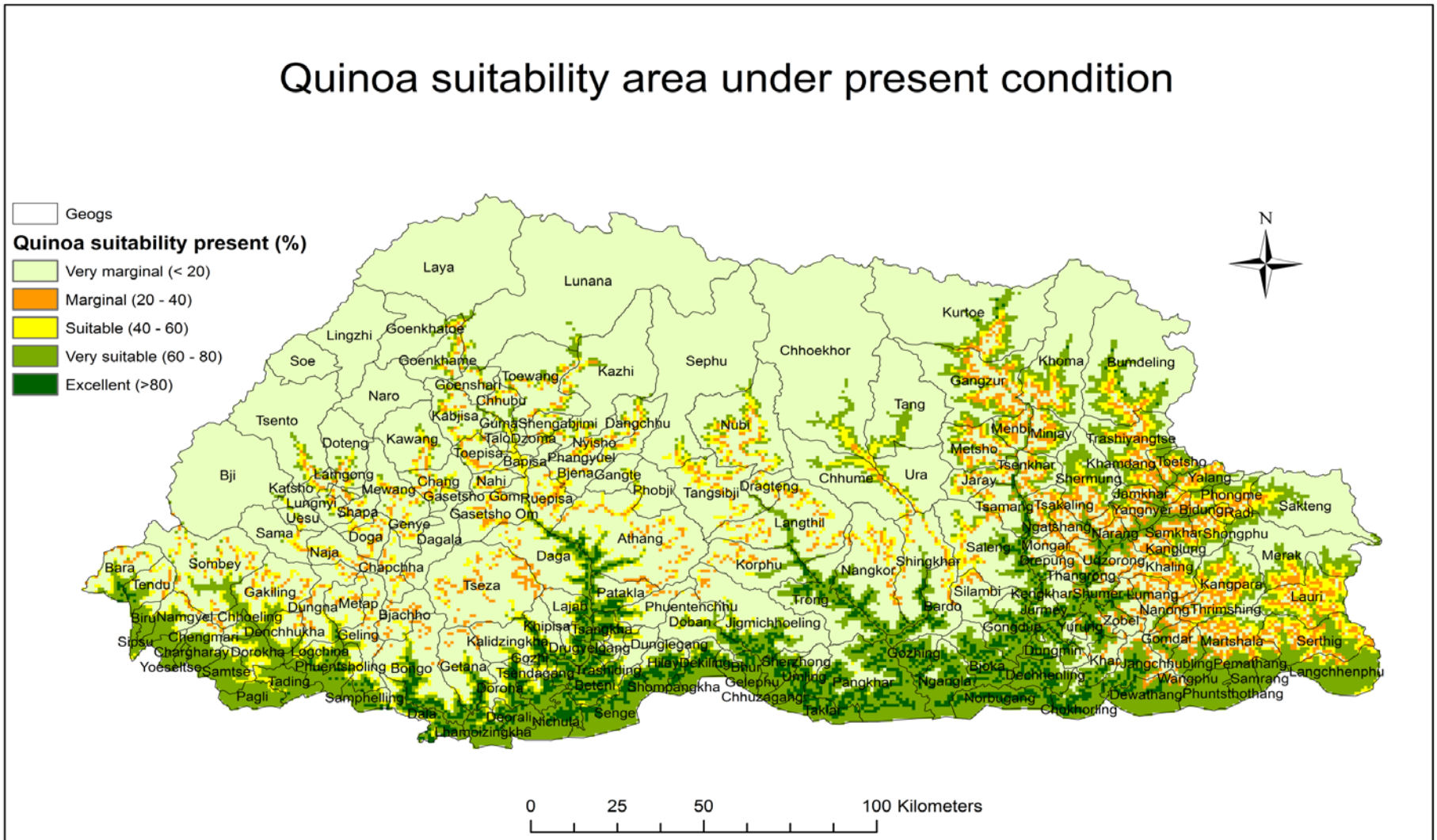
QUINOA IN BHUTAN

- Introduced in 2015
- Two varieties were introduced with support of FAO by the Department of Agriculture
- We are now working with 10 varieties across the country

OBJECTIVES

- To diversify the cropping systems
- Adapt this versatile crop to the different growing environments as a climate resilient crop
- Enhance the food and nutritional security of the Bhutanese people.

Crop Suitability Map - Quinoa



Extent of Cultivation in Bhutan (2015-16)

Estimated 1000 farmers , 40 acres

Phajoding - 3500 m asl Date of Planting 8.4.2016

Phajoding 17th November, 2016

223 days/ 7.03 months

OBSERVATION TRIAL- 2015

Variety	Locations and Altitude					
	Yusipang (2600 m asl)		**Phobjikha (2900 m asl)**		**Khangma (2100 m asl)**	
	Date of Sowing	Date of Harvest	Date of Sowing	Date of Harvest	Date of Sowing	Date of Harvest
Amarilla Marangani	26th March, 2015	1st October, 2015	27th March, 2015	24th November, 2015	7th April, 2015	18th September , 2015
Amarilla Sacaca	2nd April, 2015	7th October, 2015	27th March, 2015	24th November, 2015	25th April, 2015	2ndOctober, 2015

TRIAL RESULT - 2015

No	Variety	Yusipang (2600 m asl)			Phobjikha (2900 m asl)			Khangma (2100 m asl)		
		Plant Height (m)	Days to maturity (days / months	Yield Kg acre^{-1}	Plant Height (m)	Days to maturity (days / months	Yield Kg acre^{-1}	Plant Height (m)	Days to maturity (days / months	Yield Kg acre^{-1}
1	Amarillla Marangani	2.07	195 /6.5	**1100.00**	1.82	225/7.5	**797.60**	2.37	165/5.5	**877.77**
2	Amarillla Sacaca	1.69	182/6	**800.00**	1.63	230/7.6	**966.30**	2.52	155/5.1	**922.22**

RESULT FROM LOWER ELEVATIONS – 2015-16

Variety	Site	Altitude m asl	Date of Sowing	Date of Harvest	Days to Maturity	Yield Kg acre^{-1}
Amarilla Marangani	Samphelling	300	21.11.15	13.3.16	112	606.06
Amarilla Sacaca	Samphelling	300	21.11.15	13.3.16	112	969.69
Ivory 123	Samtse	800	5.1.2016	16.4.16	133	488.88


Amarilla Saccaca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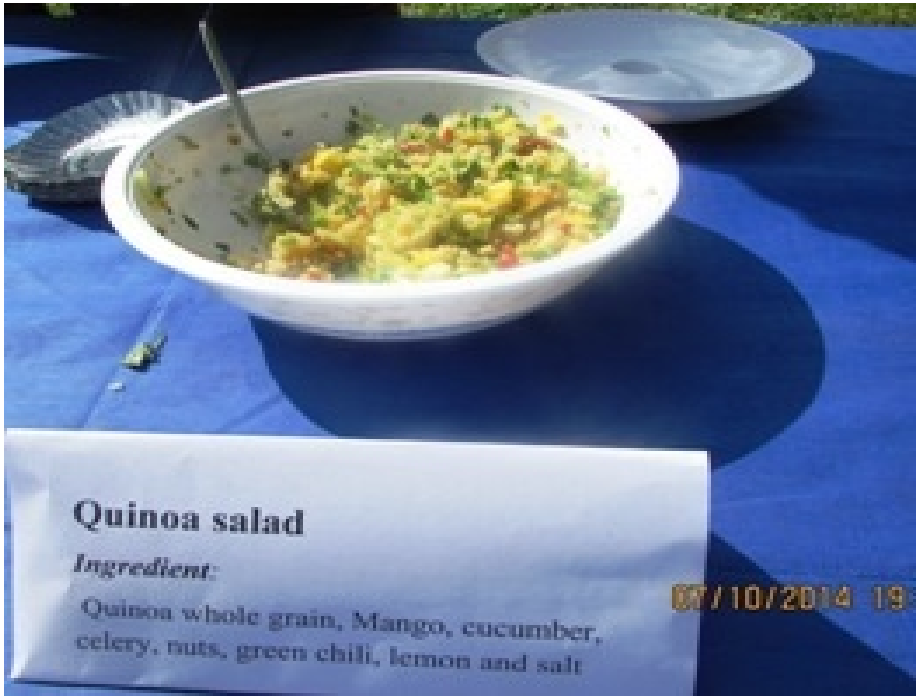
Quinoa Thuep
Ingredients:
Quinoa whole grain, onion, garlic, zinger, chili, salt and pepper
07/1


Quinoa salad
Ingredient:
Quinoa whole grain, Mango, cucumber, celery, nuts, green chili, lemon and salt
07/10/2014 19

Bidung,2015

Haa,2016

Farmer with his harvest in Samtse (2016)
Variety – Ivory 123 (Indian Variety)

Yield : 488.88 Kg/acre

CONSTRAINTS FOR UP-SCALING

1. Limited Technical Knowledge on Quinoa
2. Limited Access to Germplasm
3. Lack of Awareness and Social Acceptance
4. Adjustment of Agronomic Management Practices
5. Lack of Processing Technology
6. Inadequate Information on Price and Market

CONCLUSION

- Quinoa has been quite successfully acclimatized and adapted.
- Department of Agriculture (DoA) has accorded Quinoa a commodity status at par with staples like rice and maize.
- Two varieties namely Amarilla Marangani and Amarilla Sacaca have been identified for high altitude areas above 1500 m asl
- One Indian variety Ivory123 for areas below 1500 m asl.
- One booklet with basic information on package of practices for cultivating Quinoa has also been published.
- DoA has introduced five small scale processing machine for evaluation.
- To rapidly promote this new crop the adjustment and packaging of agronomic and production practices is fundamental.
- Identification and development of markets will be critical to upscale and expand the cultivation of Quinoa in Bhutan

THANK YOU