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Quinoa Industry Development in China

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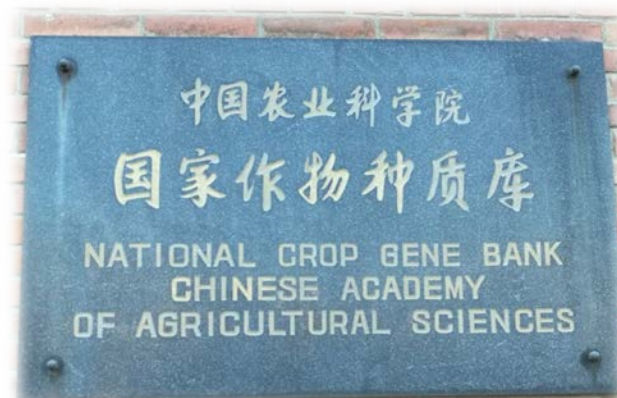
Opportunity and challenge for quinoa



Brief introduction of ICS



- ◆ 4 research departments, 357 staff
- ◆ 3 academicians, 95 professors
- ◆ 1600 papers (SCI), 300 books
- ◆ 240 certified varieties, 290 issued patents
- ◆ The 2nd biggest genebank, with more than 400 000 germplasm



Brief introduction of ICS



- ◆ The Crop Science Society of China (CSSC) belongs to ICS
- ◆ 19 committees belong to the society
- ◆ Quinoa Committee of the CSSC was founded in 2015



Brief introduction of ICS

International cooperation project for quinoa between ICS and UNALM:

China-Peru Joint Research and Demonstration of Quinoa Processing Technology



Visit Dr. Luz Rayda Gomez Pando and Dr. Ritva Ann-Mari Repo-Carrasco Va of UNALM in Peru, 2015

Brief introduction of ICS

Team achievements:

1st industrial standard for quinoa in China

1st translated book for quinoa in Chinese

9 papers (3 SCI indexed), 3 patents

- Yao, Yang, Shi *et al.* Anti-inflammatory activity of saponins from quinoa (*Chenopodium quinoa* Willd.) seeds in lipopolysaccharide-stimulated RAW 264.7 macrophages cells. *J. Food Sci.* 2014, 79: 1018-1023.
- Yao, Shi, Ren. Antioxidant and immunoregulatory activity of polysaccharides from quinoa (*Chenopodium quinoa* Willd.). *Int. J. Mol. Sci.* 2014, 15, 19307-19318
- Yao, Zhu, Gao, *et al.* Suppressive effects of saponin-enriched extracts from quinoa on 3T3-L1 adipocyte differentiation. *Food Funct.* 2015, 6(10): 3282-90





Quinoa cultivation and breeding in China



1.1 Milestone of quinoa history in China

In 1960s, the formerly **Institute of Crop Breeding and Cultivation**, Chinese Academy of Agricultural Sciences (CAAS) **firstly introduced** quinoa germplasm to China.



1.1 Milestone of quinoa history in China

In 1988, the formerly **XiZang Agriculture and Animal Husbandry College** got 3 quinoa varieties from Bolivia and started the first growing of quinoa in China.

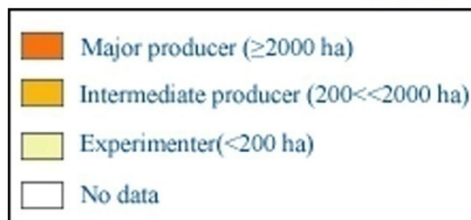
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|--|--------|----|--|--------|--------|
| 1994年16卷4期 | 西藏农业科技 | 43 | ·总第73期· | 1996·3 | 西藏科技 □ |
| 南美藜生物学特性研究 | | | 南美藜育种原始材料研究 | | |
| • 86 • | 西北农业学报 | | Studies on Quinoa Seed Proteins | | |
| PRELIMINARY STUDY OF BIOLOGICAL CHARACTERS OF QUINOA IN TIBET | | | Chen Yuquan, Gao Aili (Northwest Agricultural University, Yangling Shaanxi 712100) Gongbu Trashi | | |
| STUDY ON FROST OF QUINOA SEEDLING STAGE | | | QUINOA NUTRITIONAL CHARACTER IN TIBET | | |
| Zhang Chongxi Gongbu Zhaxi Wang Mu (Department of Agriculture, Tibetan Agriculture and Animal Husbandry College, Bayi Tibet, P. R. 860000) | | | Gongbu Trashi and Wang Mu (Agronomy Dept. Tibetan Agriculture and Animal Husbandry College, Bayi Tibet, P. R. 860000) | | |
| ABSTRACT | | | ABSTRACT | | |
| In order to know about the frost resistant ability of <i>Quinoa</i> seedling stage and supplementary test, the paper has found out the beginning temperature of stage; from frost flaccidness, seedling dying starting, number of died seedling died full. | | | Analysed 3 quinoa varieties grown in Tibet. Compared to wheat, soy, barley, and to the FAO recommended nutrition standards quinoa is nutrients balance than any other common cereal grain, and much better than Tibetan local naked barley on protein, essential amino acid and mineral content. Tibetan quinoa are a little low on protein, but well within the range found in quinoa grown in South America. | | |
| Key words: <i>Quinoa</i> , seedling stage, frost | | | Key words Tibetan quinoa; Nutrition character; Protein; Essential amino acid | | |

1.1 Milestone of quinoa history in China

In 2008, large scale quinoa cultivation started in **Shanxi province**.



Distribution of quinoa in China in 2016



| Province | Area (ha) |
|----------------|-------------|
| Shanxi | 2000 |
| Gansu | 2000 |
| Qinghai | 2000 |
| Inner Mongolia | 400 |
| Jilin | 300 |
| Hebei | 270 |
| Yunan | 330 |
| Total | 7300 |

1.2 Quinoa cultivation in Shanxi

- ◆ The first province to grow quinoa in large scale
- ◆ Jingle County: **Chinese Quinoa Hometown**
- ◆ Several enterprises lead the cultivation technology research
- ◆ No official certified cultivar

山西省静乐县：

中國藜麥之鄉

中國食品工業協會
花青素專業委員會
二〇一三年八月



山西亿隆藜麦开发有限公司

Shanxi Yilong quinoa Development Co. Ltd.



山西华青藜麦产品开发有限公司

Shanxi Huaqing Quinoa products development Co., Ltd.

1.3 Quinoa cultivation and breeding in Gansu

- ◆ Northwest of China, altitude of 1000-3400 m
- ◆ 2010, quinoa was introduced by the Animal Husbandry, Pasture and Green Agriculture Institute, Gansu Academy of Agricultural Sciences
- ◆ 2014, the first provincially registered cultivar in China, “Longli-1”

| Name | Episperm color | Yield (kg/ha) | Growth duration (d) | Thousand kernels weight (g) | Protein (g/kg) | Fat (g/kg) | Production area |
|----------|----------------|---------------|---------------------|-----------------------------|----------------|------------|-------------------------|
| Longli-1 | White | 2007 | 108-121 | 2.97-3.34 | 170.3 | 64.0 | 1500-3000 masl in Gansu |



Quinoa variety: Longli-1



1.4 Quinoa cultivation and breeding in Qinghai

- ◆ Northwest of China, low temperature, dry environment, high altitude.
- ◆ 9 cities or counties grow quinoa, highest yield 6138 kg/ha.
- ◆ “Qingli-1” was provincially certified in 2016.
- ◆ Machines are well applied

| Name | Episperm color | Yield (kg/ha) | Growth duration (d) | Thousand kernels weight (g) | Protein (g/kg) | Fat (g/kg) | Production area |
|----------|----------------|---------------|---------------------|-----------------------------|----------------|------------|---------------------------|
| Qingli-1 | White | 4977 | 140-155 | 3.01-3.33 | 148.0 | 58.6 | 2300-3000 masl in Qinghai |



Quinoa sowing and harvest by machine in China



1.5 Quinoa cultivation and breeding in Inner Mongolia

- ◆ In 1988, Inner Mongolia Agricultural University cultivated quinoa in Hohhot
- ◆ In 2015, “Mengli-1”, was certified by the Hohhot Committee of Crop Variety Certification
- ◆ In 2016, under the support of ICS-CAAS and Wulanchabu Agriculture and Animal Husbandry Bureau, 202 quinoa germplasm were cultivated.

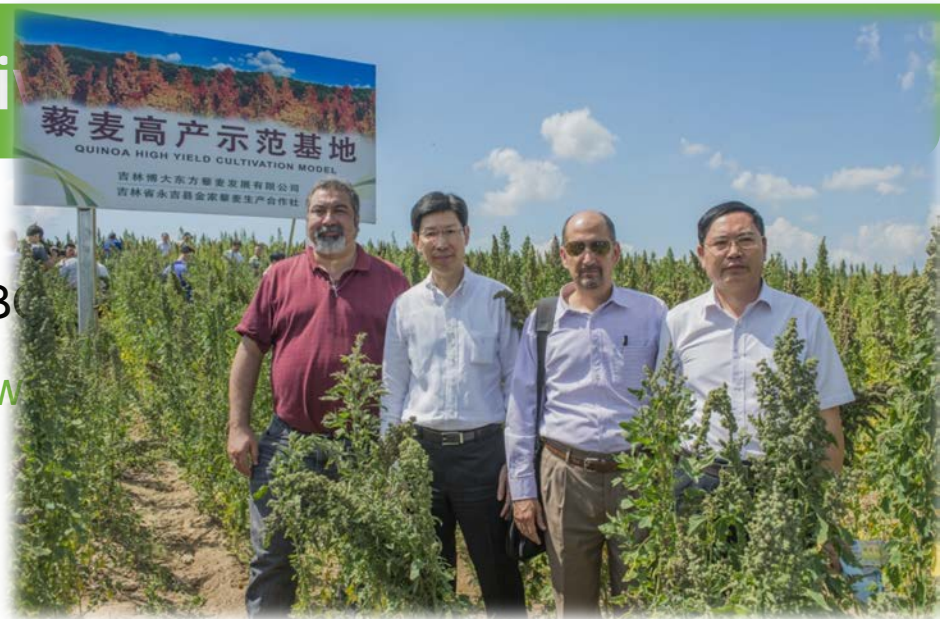
| Name | Episperm color | Yield (kg/ha) | Growth duration (d) | Thousand kernels weight (g) | Protein (g/kg) | Fat (g/kg) | Production area |
|----------|----------------|---------------|---------------------|-----------------------------|----------------|------------|----------------------------------|
| Mengli-1 | White | 2865 | 107-115 | 2.85-3.14 | 166.0 | 64.5 | 1000-1800 masl in Inner Mongolia |

Different quinoa germplasm in Inner Mongolia



1.6 Quinoa cultivation

- ◆ In 2013, quinoa was cultivated by Jilin BO
- ◆ The 1st China Quinoa Industry Summit was



1.7 Quinoa cultivation in Hebei

- ◆ In 2013, quinoa was firstly cultivated with the yield of 3637.35 kg/ha
- ◆ In 2015, the only quinoa institute in China was established



A 和 B: 灌浆期穗 ; C 和 D: 完熟期穗

A and B: Panicles in grain filling stage, C and D: Panicles in full ripe stage



1.8 Quinoa cultivation in Yunnan

- ◆ Started in 2015, at Yongsheng County, led by Taimei Group Company
- ◆ In 2016, increased to 330 ha with the yield of 3000 kg/ha
- ◆ Machines were rarely used



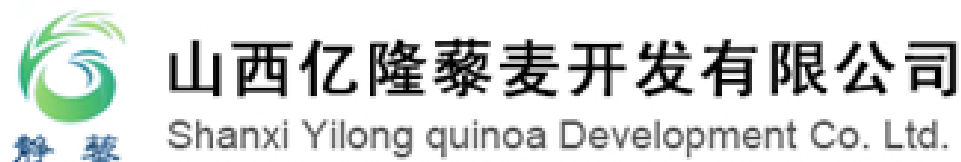
2

Quinoa product and market in China



2.1 Quinoa company in China

- ◆ 60 registered quinoa companies, half of them located in Shanxi.



2.1 Quinoa company in China

| | | | | |
|--------------|----------------|--------------|---------------|--------------------|
| 山西稼祺藜麦开发有限公司 | 静乐县鑫盛隆藜麦开发有限公司 | 静乐县娑婆乡万家乐藜麦 | 沁源县信德藜麦开发有限公司 | 静乐县娑婆乡松柏青藜麦种植专业合作社 |
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| 永吉县西阳红藜麦种植农 | 静乐县娑婆乡百和旺藜麦 | 民乐县西北堂藜麦科技有 | 山西忻静藜麦种植推广有 | 高台县陇祁藜麦专业合作社 |
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2.2 Quinoa products in China

◆ Quinoa products in Chinese market



Pearled quinoa



Quinoa flour



Quinoa noodle



Quinoa bread



Quinoa moon cake

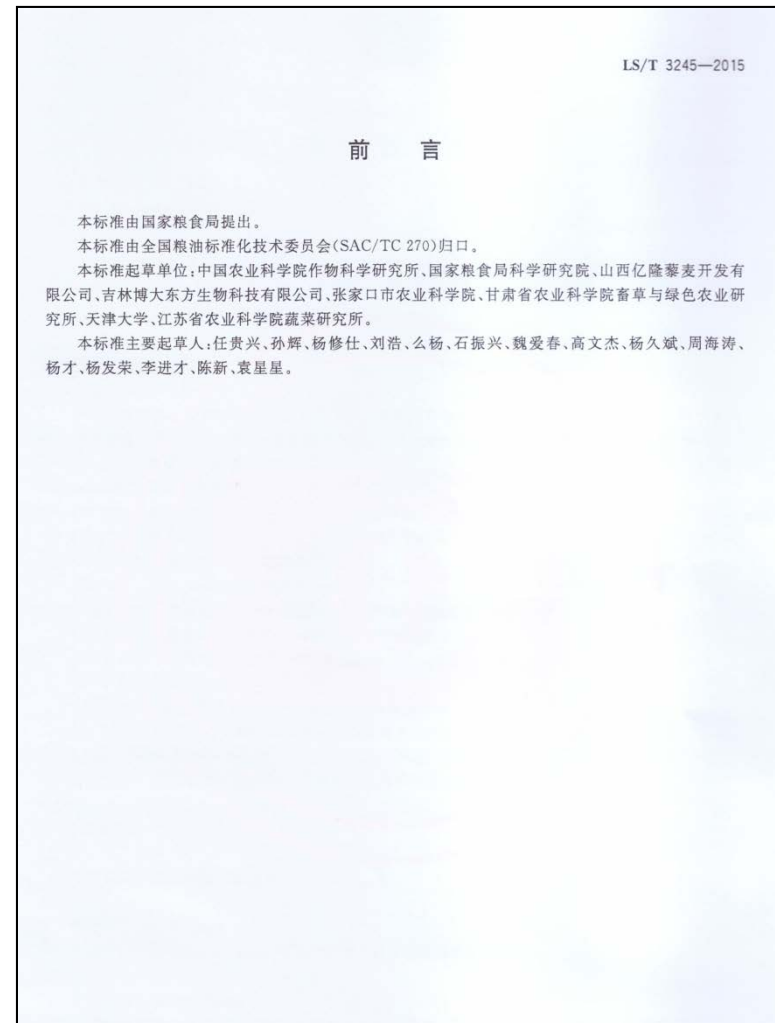
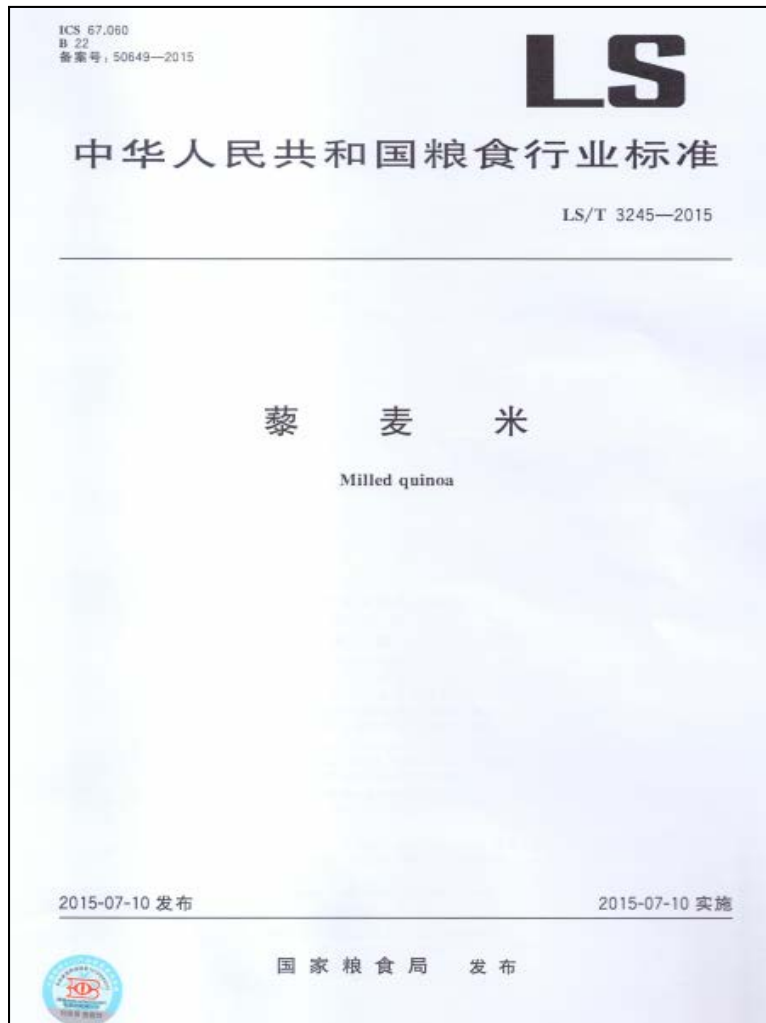


Quinoa yellow wine



Quinoa wine

- ◆ Quinoa was a new resource plant in China.
- ◆ In 2015, the first industrial standard for quinoa (*Milled quinoa*, LS/T 3245-2015) was approved by the State Administration of Grain.



2.3 Quinoa market in China

- ◆ Formally produced pearled quinoa is priced from 11 to 26 \$/kg
- ◆ The main marketing channel is e-commerce site
- ◆ Organic product will come into the market soon

淘宝网
Taobao.com

我买网
womai.com
传承中粮品质·专注全球美食

 苏宁易购
suning.com

天猫 TMALL.COM

 JD.COM 京东
多·快·好·省

3

Opportunity and challenge for quinoa



3.1 Great chance to develop quinoa in China

- ◆ The cultivation area of maize will be decreased for more than 666,700 ha
- ◆ 5,000,000 ha of potato need to be rotated to restore soil and keep the yield



3.1 Great chance to develop quinoa in China

- ◆ Climate change and water resource shortage are calling for new crops
- ◆ Healthy diet is becoming more and more popular in China



3.2 Challenges in quinoa development

- ◆ Lack of variety with big-size and white-color seed
- ◆ Fertilization, pest control, and disease control research must be improved
- ◆ Products diversification and market development



3.3 Prospect of quinoa in China

- ◆ China is a country with big population.
- ◆ Food production and safety is always the basic issue for the government
- ◆ Quinoa, with its great nutrition and resistance to biotic stresses, will certainly play an important role in Chinese agriculture.



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Thank you very much for your attention!

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[Chinese Quinoa Video by Gansu Yongchang Yangshengsanbao Food Company Ltd.](#)