Modern Ready-to-Eat Products from Pseudocereals

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Overview

1. Short introduction:
   - Nutritional properties
   - Functional properties

2. Historical development and market today
   - Traditional products
   - Gluten-free foods
   - Modern food products
Pseudocereals

amaranth  quinoa  buckwheat
Nutritional Value

• **Protein**: similar amounts than cereals, but much higher quality (BV): high content of essential amino acids (lysine!, arginine and histidine).

• **Fat content**: higher, high number of ess.FA, linolenic acid, contains squalene

• **Starch**: slightly less than in cereals, small starch granules, low amylose (amaranth and quinoa), high amylose (buckwheat) → influence processing

• **Dietary fibre**: average (compared to cereals)

• **Minerals**: twice as much as cereals (Ca, Mg, Fe, K, Zn)

• **Vitamins**: some are much higher (folic acid!!)

• **Secondary plant metabolites**: rutin – buckwheat
Physiological properties

Quinoa
• High protein digestibility
• High starch digestibility (GI not fully clear)
• Cholesterol lowering effect after consumption of quinoa
• Anti-oxidative, antitumor, blood glucose level decreasing effect

Amaranth
• High protein digestibility
• Cholesterol lowering effect (oil and certain peptides)
• Anti-oxidative, antithrombotic effect (certain peptides, phenols)

Buckwheat
• High protein digestibility
• Starch – low GI, high content of resistant starch (high amylose)
• Anti-oxidative, antimicrobial, anti-inflammatory effect (due to high amount of rutin)
Functional properties

Amaranth and quinoa have different physical properties compared to cereals. Due to the high content of amylopectin and small starch granule size:

- higher viscosity
- good freeze-thaw stability
- higher water-binding capacity
- higher swelling power
- show less retrogradation

→ excellent ability as thickening agent
Quinoa varieties
Coloured quinoa varieties – chemical composition

Own measurements (Schoenlechner R, Fellhofer E, Guz L, Repo-Carrasco R et al. 2016 – to be published soon)

→ High future potential of these varieties
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(focus on amaranth and quinoa)
Historical Facts

Amaranth and Quinoa:
- In Pre-Columbian times they were basic foods.
- After Spanish Conquest: suppression of its cultivation.
- Since the 1970ies: both crops are experiencing a renaissance.
- Until the year 2000 - absolute niche products.

Buckwheat:
- Origin: middle Asia.
- Transferred by nomadic people.
- 13th century: middle Europe (Germany, Austria, Italy).
- Importance was lost due to cultivation of cereals.
Traditional dishes

Traditional quinoa dishes: *pastel quinoa* (left) and *chupe de quinoa* (right)
Traditional dishes

„Alegria“ popped amaranth
Since the year 2000…

especially quinoa….

reasons:
• nutritional quality
• glutenfree products
• Trends: grain-free, wheat-free, ancient, healthy, alternative…

… “superfoods”
... and ...

**Grain Brain**
David Perlmutter, MD

**Wheat Belly**
William Davis, MD
• Grain-free benefits from a perception of health, viewed as a less processed diet and fits with consumers’ gradual shift away from processed foods. Some 43% of US consumers are planning to eat less processed food in the next year according to Mintel’s American Lifestyle 2014 report.

• grain-free is starting to emerge as the next generation of (and healthier alternative to) gluten-free.

• product launches is currently very niche... According to Mintel’s Global New Products Database (GNPD), since 2010 there has been a 134% increase in the launch of bakery products with non-grain flours: use of alternative grains and seed flours, nuts, fruit and vegetables, almond, peanut, coconut, pea, soybean and potato, with almond, chickpea and cassava leading the way.
Agrana (Austrian starch company):
Top Trend: “Alternatives” - from niche to mainstream

4 main drivers for this food trend:
• Health awareness
• Animal welfare concerns
• Environmental consciousness
• A curiosity to explore new flavors

The main players in dairy alternative source products are:
• Grains such as rice and oat
• Nuts like almonds, cashews, hazelnuts, ...
• Seeds such as quinoa or hemp seeds
• Others – for example lupins, peas, coconuts, soy and various blends

Opportunities for you:
• Creating new alternative products and new taste combinations will attract not only millennial consumers.
• Developing exciting new sensory experiences for the grab & go market.
• Gaining new market shares by developing products for the alternative food market.
• Developing alternative product lines for regions with fewer plant-based products.

New Product launches (worldwide)

→ Immense increase after the year 2000
Gluten-free products from/with amaranth, quinoa or buckwheat (worldwide)

Product Launch Analytics, © Datamonitor, 2018
The Top 5 African Superfoods
1. Tamarind
2. Kenkiliba
3. Moringa
4. Teff
5. Amaranth

https://dreamkitchen.solutions/ideas/african-superfoods

Countertrend: regional, local, seasonal „blacklist superfoods“
Production of buckwheat and quinoa

FAOStat, 2018
Most quinoa production comes from the Andean region of South America. Bolivia and Peru, the leading suppliers, together account for over 90 percent of world production.
Peru and Bolivia: quinoa production shifts from being a traditional, subsistence crop to an export-oriented cash product

Concern: price of quinoa has increased immensely.

→ poor households replace quinoa with less expensive but nutritionally inferior food products (rice, bread, pasta…)

Sources:
• Food Outlook Biannual Report on Global Food Markets, June 2013, FAO
• Quinoa an Ancient Food Crop, 2011
• Neglected Crops, … FAO 1994
Growing quinoa

Quinoa can be found **natively in all countries of the Andean region**, from Colombia to Argentina to the south of Chile with almost all production in the hands of small farmers and associations. **FAOSTAT** reports that, in the **period 1992–2010**, the cultivated area and total **production of quinoa** in the main producer countries of Bolivia, Peru and Ecuador almost doubled and tripled respectively. In 2009, production in the Andean region amounted to approximately 70,000 ts.

Quinoa cultivation is spreading and now occurs in more than 70 countries, including France, England, Sweden, Denmark, Holland and Italy. It is also being developed successfully in Kenya, India and the United States.

Faced with the challenge of increasing the production of quality food to feed the world's population in the context of climate change, **quinoa offers an alternative for those countries suffering from food insecurity**

Cereal production

- Maize: 37%
- Rice, paddy: 26%
- Wheat: 26%
- Main cereals (maize, wheat, rice): 89%

- Sorghum: 2%
- Barley: 5%
- Oats: 1%
- Millet: 1%
- Triticale: 1%
- Rye: 1%
- Buckwheat: 0%
- Fonio: 0%
- Quinoa: 0%
- Canary seed: 0%

FAOStat, 2018
Quinoa and Amaranth (-products) available in the supermarket today (South America)

Quinoa products available in the supermarket in Peru today: white quinoa, red quinoa, black quinoa (top)

quinoa and amaranth porridge (right)
Modern Products: Examples
(Germany, Austria, Switzerland)
Schon gewusst?
Wir von Allos haben Amaranth, das Superkorn der Inkas, 1982 nach Deutschland und in unsere Produkte gebracht.
Modern Products: Examples worldwide

- Del Destino Quinoa Salad
- Quinoa Manzana
- Simply7 Quinoa Chips
- Quinoa Oatmeal
- Vegetarian Quinoa Burger
Modern Products: Examples worldwide

the all-natural, nutritionally-balanced Smart Fuel that keeps you going
Modern Products: Examples worldwide

http://www.fair-drinks.com/

Georg Hiebl
Brenner | Mostviertel, Niederösterreich

http://www.corsairartisan.com/quinoa_whiskey.html
Attributes:
Ancient
Super- (food/grains/seeds)
Power
Gluten-free
Vegan, vegetarian
Traditional
healthy
Amazing
Inka
Aztec
Paleo

Sale online (e.g. Amazon) (foods!)

Amazon.de (6.March 2018): Kochbuch
39 Amaranth, 64 Buchweizen, 251 Quinoa (plus 20 since January 2, 2018)

Amazon.com: cookbook
63 Amaranth, 945 quinoa, 66 buckwheat
If we look on the product range in more detail...

Raw, cooked, milled, popped, extruded, …

→ Snack foods, mueslis, granola bars, salads, burgers, beverages, …

Very few products: pasta and bakery products!

– these depend much on gluten, to produce them gluten-free (from pseudocereals) is still a challenge: lots of ingredients, food additives, etc. needed, as well as process adaptation

Example: 100% quinoa pasta (Laura Linares, Peruvian PhD student)

<table>
<thead>
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<th>Tratamiento</th>
<th>Chía (%)</th>
<th>Pea Protein (%)</th>
<th>Firmness (N)</th>
<th>Cooking Loss (%)</th>
<th>Cooking Weight (%)</th>
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<td>4,00</td>
<td>1,07</td>
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</tr>
</tbody>
</table>
Conclusions

- Pseudocereals can be found in all markets, supermarkets today: Snack foods, mueslis, granola bars, salads, burgers, beverages, …

- Even if this gives the impression that they are slowly becoming staple foods today, production worldwide is still low compared to the main cash crops like wheat or maize.

- With regard to taste – population seems to get accustomed.

- Gluten-free products based on pseudocereals still delivers inferior products and remains a challenge for research.
Thank you

For further reading (scientific) … new releases 2017