Quinoama – a revolutionary ancient grain novel bread

The ANGREADERS – The Netherlands

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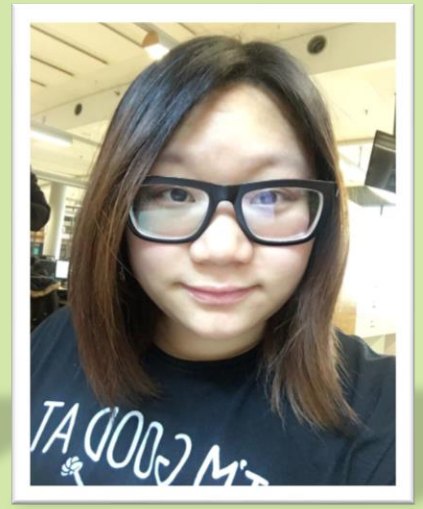
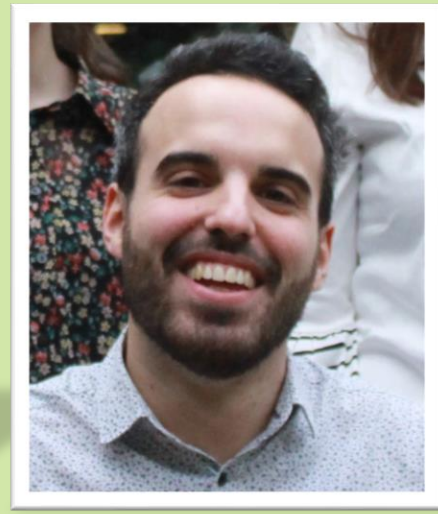


Xintong Xie



Stefano Parenti

Next FOOD

ICC International Association for Cereal Science and Technology

FoodFactory-4-Us international student competition game

European FooD-STA ISEKI Food Association

AHDB AGRICULTURE & HORTICULTURE DEVELOPMENT BOARD

Present challenges

9.7 billion
population
by 2050
- FAO

70%
increase of food
production
- FAO

Challenges

Explore potential cereal grains

- High growth cost of wheat
- Increasing demand for gluten-free bread

Reduce food waste

- Bread packaging waste
- Nowhere to go for stale bread

Problems

Possibilities

1, Potential cereals: amaranth and quinoa

Table 1: comparison between wheat amaranth and quinoa

	Growing days	Water needed	Amylose	Protein	Others
Wheat	120-150	450-650 mm	25%	13%	
Amaranth	40-50	resistant to moisture stress	10%	High amounts of protein, especially in lysine	Gluten absence
Quinoa	80-240	200-280 mm	-	14%	Gluten absence; Resistant to abiotic stresses

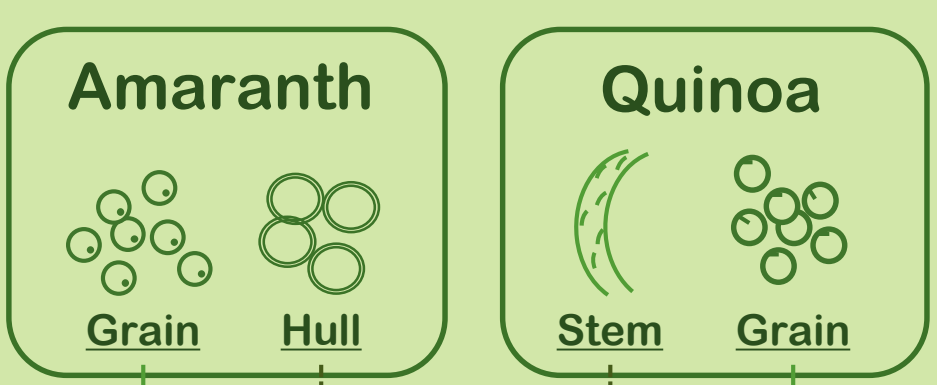
2, New biodegradable packaging material

Grain hull

3, Possible usage of stale bread in vodka production

Vodka from bread

Strategy



Biodegradable packaging

Cereal chain

Vodka production

Community center

Stale bread

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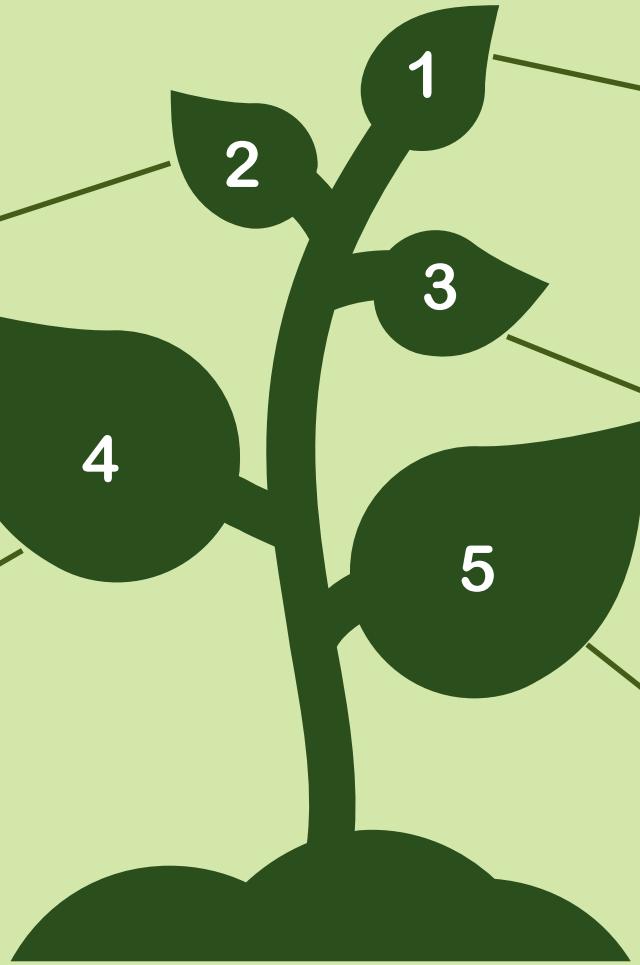


1. Ingredients and bread production
2. Biodegradable packaging
3. Valorization of stale bread
4. Logistics – Community center
5. Economic and consumer aspect

I. Ingredients and bread production (1)

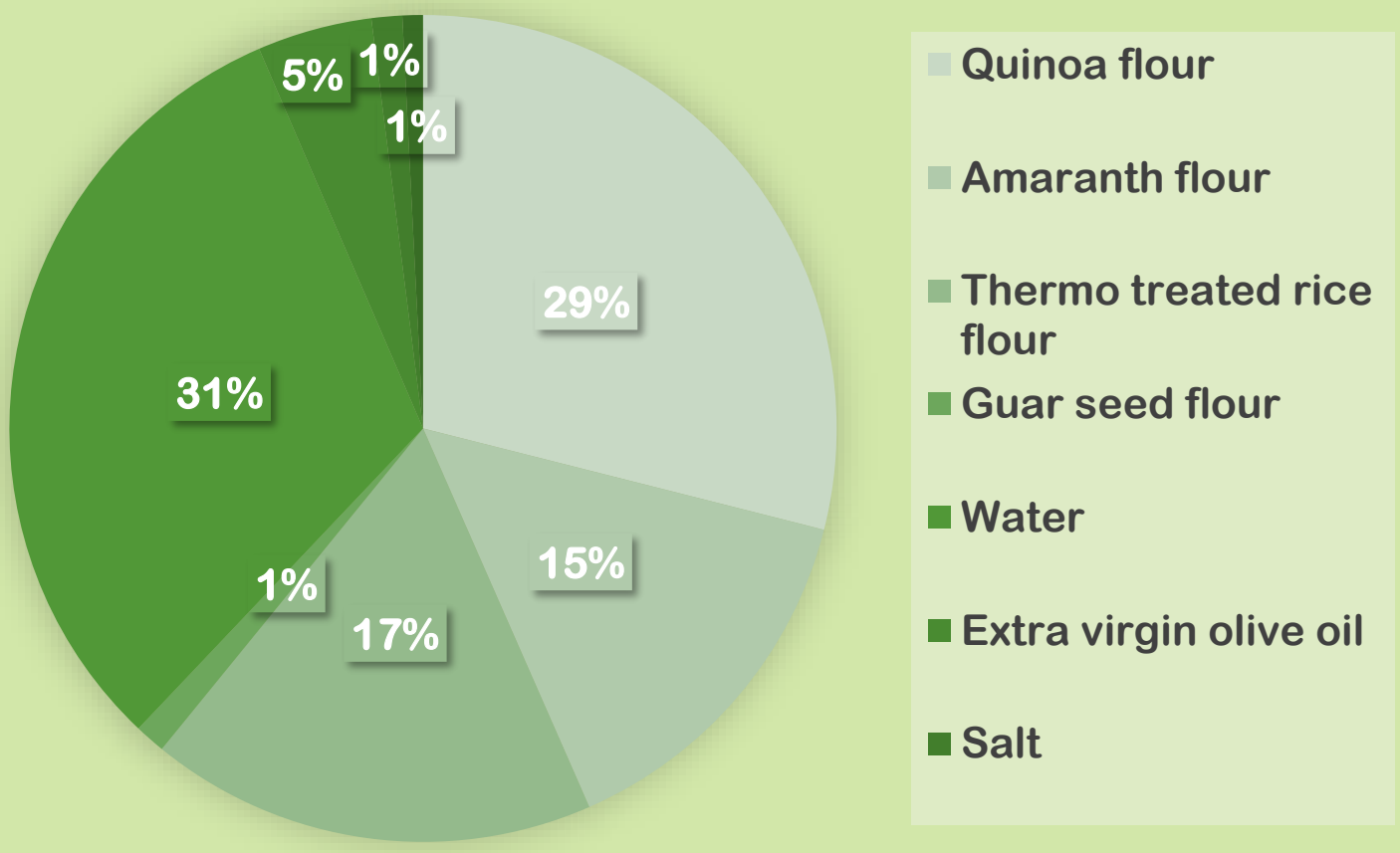


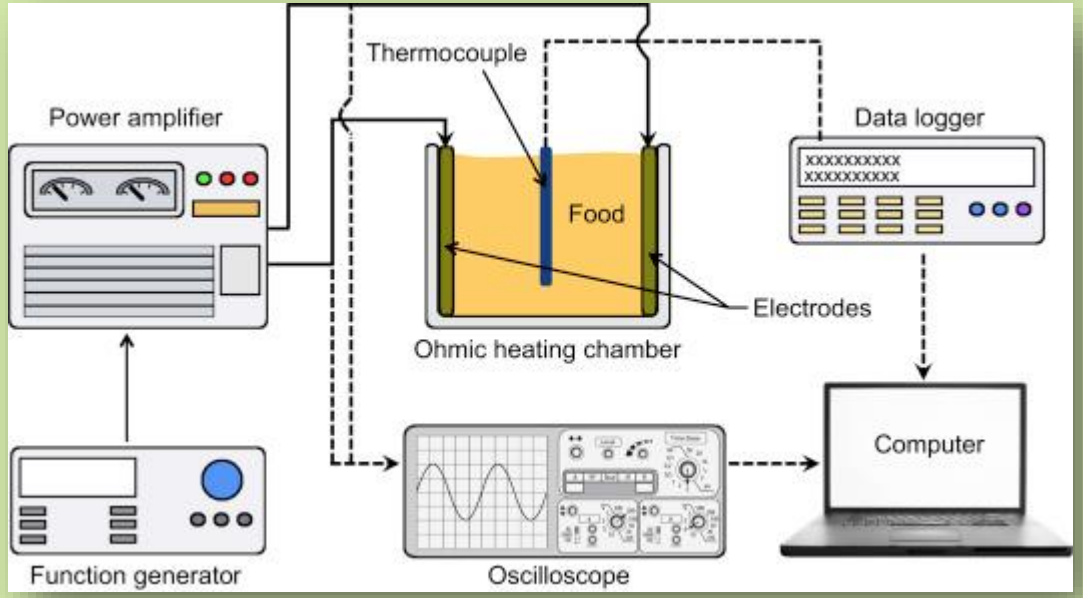
Chart 1 : Ingredients for Quinoama dough

* Transglutaminase: 1 Unit per gram of protein present in the mix

Transglutaminase
- Introduce covalent bonds between proteins
- Improve the retention of air bubbles

Moore et al., (2006)

I. Ingredients and bread production (2)



Ohmic heating

- Reduced energy cost and cooking time
- Increased air bubble retention
- Improved dough quality
- Smoother texture

Kouba et al., (2019)

II. Biodegradable packaging material (1)

<u>Stem of quinoa</u> considered as packaging material for bread

Raw material - cellulose

Sfiligoj et al., (2013)

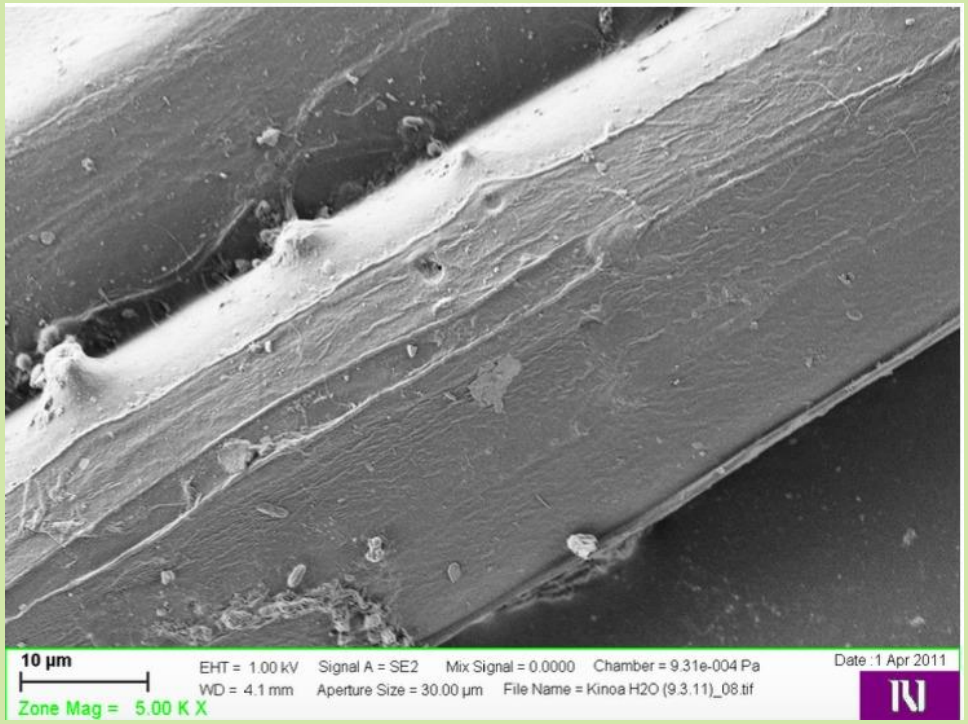
II. Biodegradable packaging material (2)

Delignification technology in alkaline pulping processes

Alkaline medium at 100 oC, in which sodium hydroxide as the chemical agent

Cooperation with a paper manufacturing company

Hemp

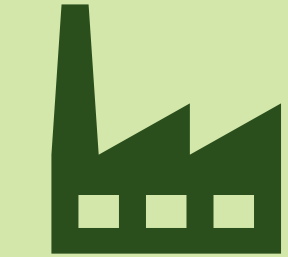


Quinoa fiber

Sfiligoj et al., (2013)

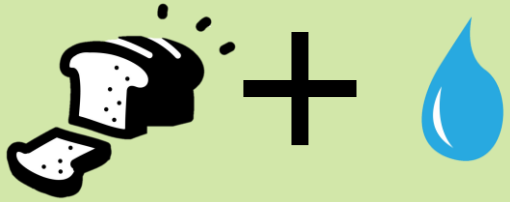
III. Valorization of stale bread (1)

30% of bread goes to waste!



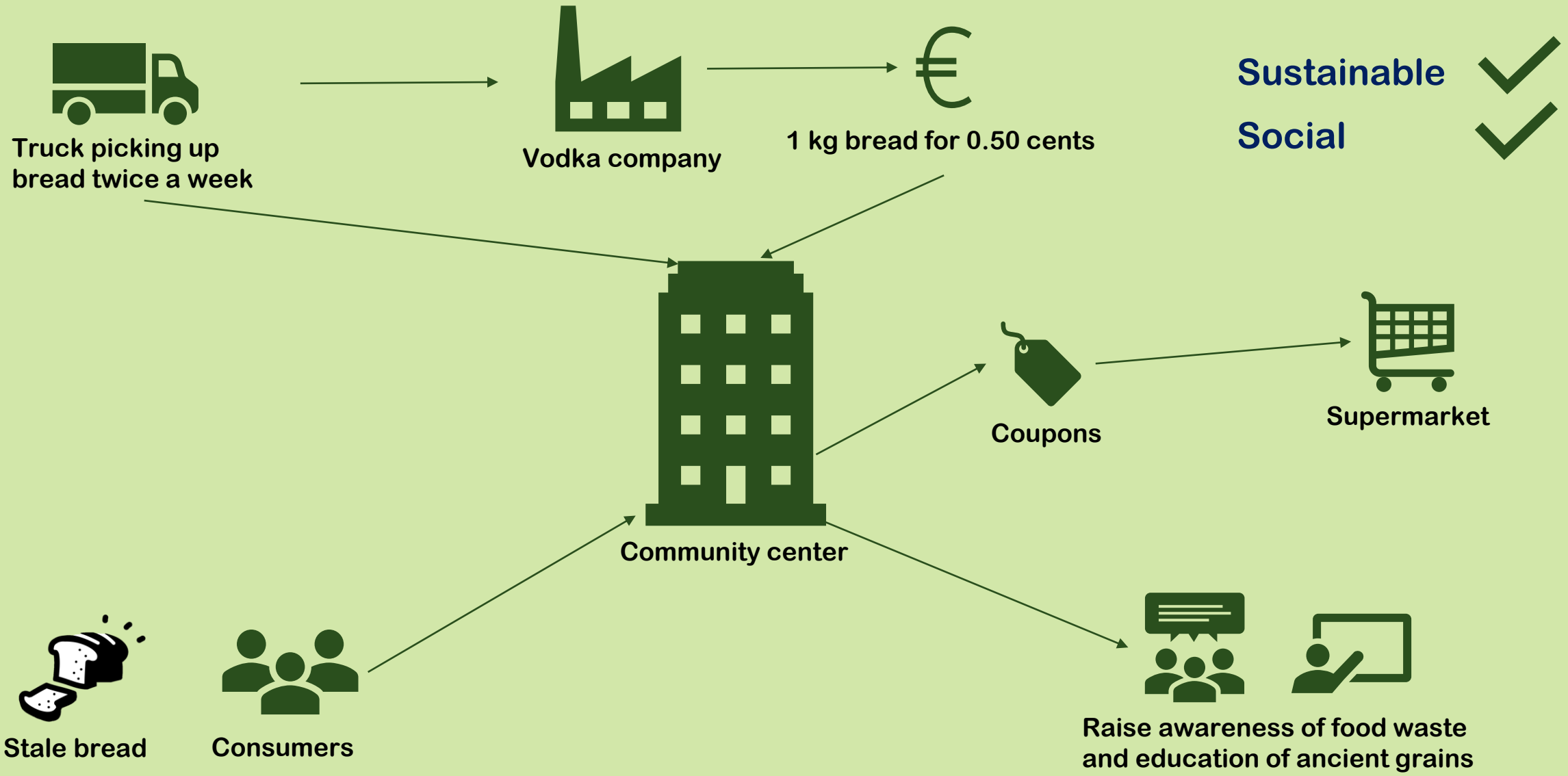
Vodka company

Mashing → Fermentation → Distillation → Equilibration



Palmer (2004) Ebrahimi et al., (2008) FAO (2011)

IV. Logistics – Community center (1)



V. Economic and consumer aspect

Quinoa

Stem Grain

6 times more expensive than

Gluten-free products are **240%** more expensive than conventional wheat bread

Amaranth

Grain Hull

Sensorial characteristics important in bread and gluten-free bread!

3 times more expensive than

Quinoama's Quinoa and Amaranth gluten-free bread

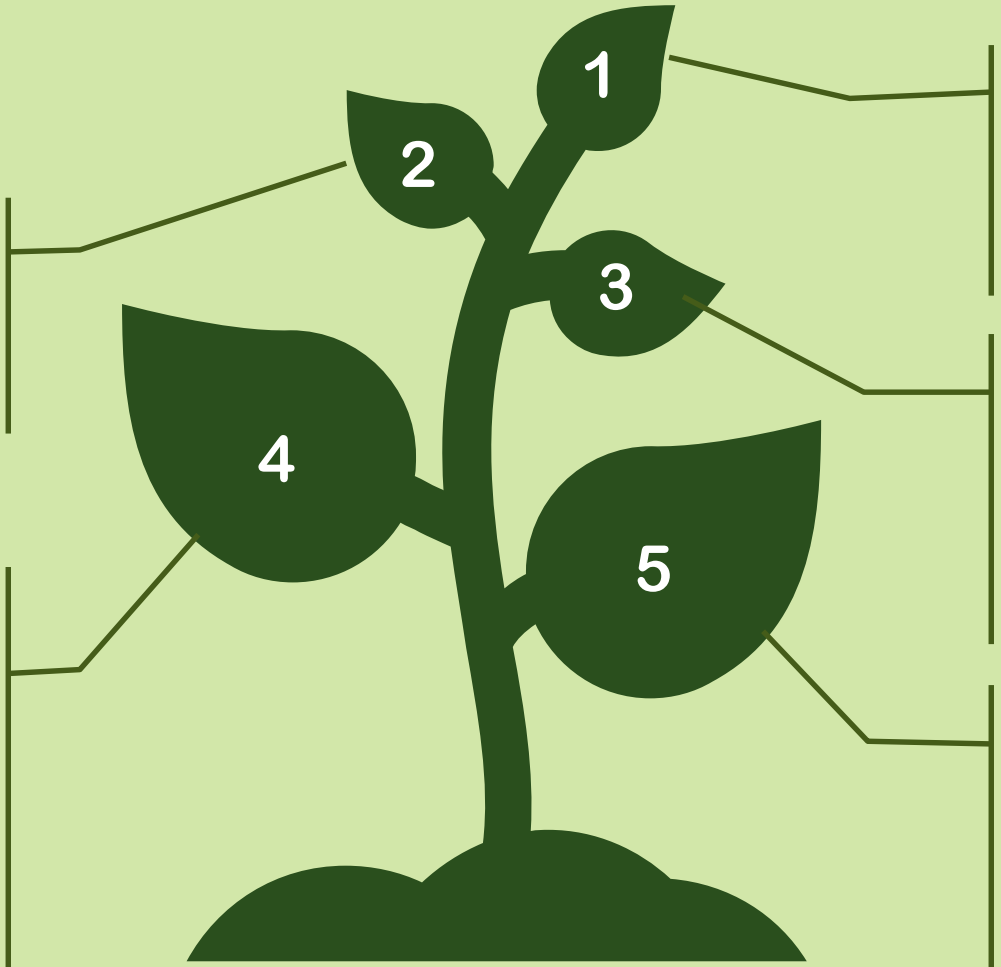
€2.50 - €4.00 per 500 g

do Nascimento et al., (2004) De Notenshop BakTotaal

Take-home message

Transglutaminase improves dough quality of GF bread

Stale bread can be transformed into ethanol for vodka and community centers make the society to have a more sustainable and social lifestyle



Amaranth and quinoa show potential in improving sustainable cereal chain

Using stem from quinoa as packaging material for bread to reduce the use of paper produced by wood

Quinoa and Amaranth GF bread has potential to be liked by consumers


Thank you!