

Sorghum: a climate-smart crop for gluten-free products

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Aim of the SOUL Project

The aim of the SOUL project was the development of a sorghum value chain for human consumption

Background

The **unpredictable effects of climate events** are threatening global food security. The use of **climate-smart crops** could represent a valuable agronomic resilience strategy.

Sorghum (*Sorghum bicolor* (L.) Moench)

viable alternative to other spring-summer cereals

- C4 photosynthetic cycle cereal
- Efficient use of water
- Tolerant to heat stress and drought
- Gluten-free cereal rich in bioactive compounds

Processing of food-grade sorghum hybrid 'Artista' kernels

INNOVATIVE TECHNOLOGICAL APPROACHES

DEBRANNING

STONEGROUNDING

AIR-FRACTIONATION

Fine fraction

PARBOILIZATION

MICRONIZATION

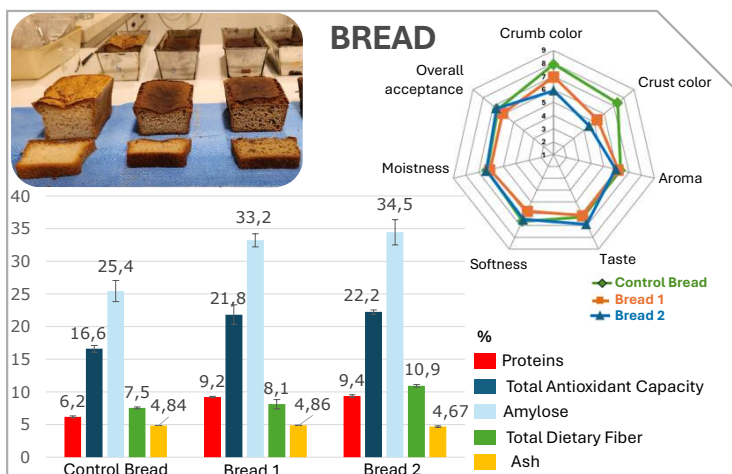
AIR-FRACTIONATION

Fine fraction

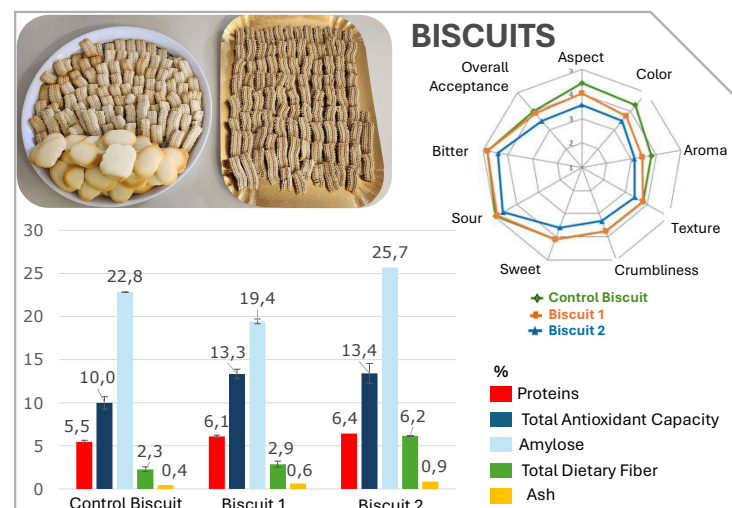
BREAD 1 BISCUITS 1

BREAD 2 BISCUITS 2

CONTROL BREAD/BISCUIT: Gluten free flour mix



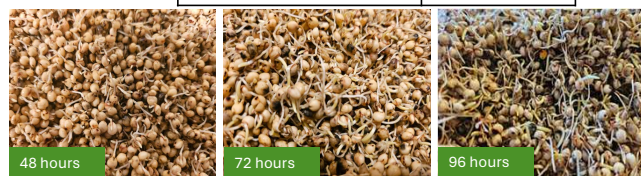
Results indicated that sorghum bread and biscuits showed a satisfactory sensorial acceptability thanks to the combined application of different innovative technological approaches used, that has allowed to obtain whole meal flours with a reduced grittiness, characteristic of sorghum milled products. Moreover, these products have shown good nutritional value, mainly in terms of total antioxidant capacity and total dietary fiber, when compared to gluten-free control bread and control biscuits



MALT

MALTING PROGRAM

STEERING	6 h, 25 °C
AIR REST	4 h, 25 °C
STEERING	7 h, 25 °C
GERMINATION	96 h, 28 °C
DRYING	50 °C 60 °C

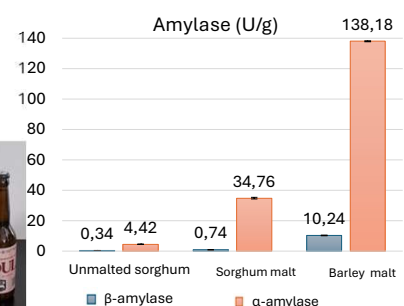


	Total Starch g/100g	Ash g/100g	Fiber g/100g	Protein g/100g	TPAC ugCE/g s.s	TSPC mgFAE/g s.s	TAC mmol TEAC/kg
Unmalted	78,4 ±0,7	1,38 ±0,006	13,64 ±0,60	12,68 ±0,16	1,47 ±0,034	0,45 ±0,012	27,14 ±1,22
Malt	67,3 ±2,46	1,22 ±0,01	10,68 ±0,16	12,02 ±0,19	5,97 ±0,19	0,77 ±0,02	30,16 ±0,04

Malted kernels had an increased polyphenols and proanthocyanidins content respect to unmalted grains. Sorghum malt has been also used for beer production.



Pils Beer
50% Sorghum :50% Barley
Alc. 4,2% vol.



Galassi, E., Taddei, F., Ciccoritti, R., Nocente, F., & Gazza, L. (2020). Biochemical and technological characterization of two C4 gluten-free cereals: Sorghum bicolor and Eragrostis tef. *Cereal Chemistry*, 97(1), 65-73.

Nocente, F., Galassi, E., Taddei, F., Natale, C., & Gazza, L. (2023). Preliminary evaluation of minor cereals as non-traditional brewing raw materials. *Beverages*, 10(1), 2.

Conclusion

Sorghum could constitute a **promising raw material** for enhancing the agro-food biodiversity and meet the growing market demand for sustainable and healthy gluten-free products.



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