Foods 2024 Conference

The 5th International Electronic Conference on Foods

28–30 October 2024 | Online

MDPI

Agro-industrial by-products for potential development of gluten-free Type I sourdoughs

Irigoytia KF(1), Arora K (2), Polo A (2), Ameur H (2), Gobbetti M (2), Genevois CE (1), de Escalada Pla MF (3)

(1) Instituto de Ciencia y Tecnología de los Alimentos de Entre Ríos (ICTAER), CONICET-UNER. Pte. Perón 1154 (E2820), Gualeguaychú, Entre Ríos, Argentina.
(2) Faculty of Science and Technology, Libera Università di Bolzano, Piazza Università, 5, 39100 Bolzano, Italy.
(3) Instituto de Tecnología de Alimentos y Procesos Químicos (ITAPROQ), CONICET-UBA. Intendente Güiraldes 2160 (C1428EGA), CABA, Argentina.

INTRODUCTION & AIM

Sourdough (SD) is a fermented dough used traditionally as a natural leavening agent in baked goods. The use of agro-industrial by-products, such as soybean extruded-expelled meal (SD-SEE) and rice bran (SD-RB), not only contributes to sustainability by reducing waste, but also presents an opportunity to develop gluten-free (GF) products that improve technological, nutritional, and sensory characteristics. The aim of this work was to microbiologically and biochemically characterize Type I-SD prepared with agro-industrial by-products such as SD-SEE and SD-RB.

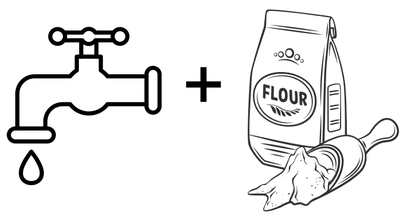
METHOD

1. Agro-industrial by-products

Milled (HC-1000Y, Arcano, China) at 32.000 RPM for 15 min and sieved through an 840 µm mesh (ASTM No. 20, Zonytest, Argentina).

2. Dough preparation and sourdough propagation

2.1. Preparation of dough



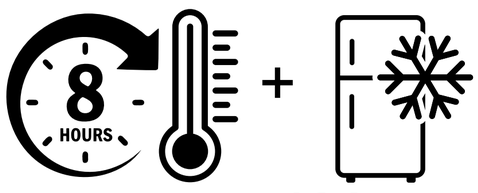
Ratio water and flour
SD-SEE: 2.5:1 - SD-RB: 1.5:1

2.2. Sourdough propagation

1st fermentation

25°C

Daily fermentations



25°C 16 hours

25% (w/w) of the previous day's SD as inoculum for the new flour mixture.

3. Microbiological and biochemical characterization

- pH and total titratable acidity (TTA) was measured on 10 g of sample, which was homogenized with 90 mL of distilled water for 3 min
- *Enterobacteriaceae,* were enumerated on VRBD agar medium at 37°C for 24 h; lactic acid bacteria (LAB), 30°C for 48 h under anaerobiosis using modified MRS agar; and yeasts were enumerated at 30°C for 48 h on PDA
- Glucose, fructose, maltose, and mannitol, lactic and acetic acid concentrations by HPLC.

RESULTS & DISCUSSION

a.

b.

Fig. 1. Cell densities (log CFU g-1) of presumptive LAB, yeasts, and *Enterobacteriaceae* and dough acidification during preparation and propagation. Sourdough was daily propagated for 10 days; a- SD-SEE b- SD-RB

Table 1. Biochemical characterization during the preparation and propagation of by-products up to 10 days

	Days of SD propagation	pH	TTA (0.1 N NaOH/10 g of dough)	Lactic acid (mM)	Acetic acid (mM)	Glucose (mM)	Fructose (mM)	Mannitol (mM)
SD-SEE	D0	6.3	2.8	N/D	4.25	44.41	40.86	N/D
	D10	4.5	16.1	514.28	123.09	30.15	10.71	40.59
SD-RB	D0	6.7	6.3	N/D	2.08	206.54	84.25	N/D
	D10	4.2	36.4	505.16	59.81	10.72	10.35	50.36

10 DAYS OF FERMENTATION

Cell densities of presumptive LAB and yeasts (log CFU g-1), mannitol, lactic and acetic acid concentrations (mM) due to microbial activity during the fermentation process.

pH and content of glucose, fructose and maltose (mM) indicating their utilization by the fermenting microorganisms.

The culture-dependent method did not detect Enterobacteriaceae counts (log CFU g-1) due to the acidic environment of SD

CONCLUSION

These findings highlight the promising use of industrial by-products in GF-SD, underscoring the importance of continuing to explore and optimize these processes to enhance the nutritional and sensory quality of the final bakery products.

FUTURE WORK / REFERENCES

It is suggested to carry out breads and sensory evaluations to explore preferences and perceptions of these products.