

Supplementary material

Improving Nutritional and Health Benefits of Biscuits by Optimizing Formulations Based on Sprouted Pseudocereal Grains from Andean Origin

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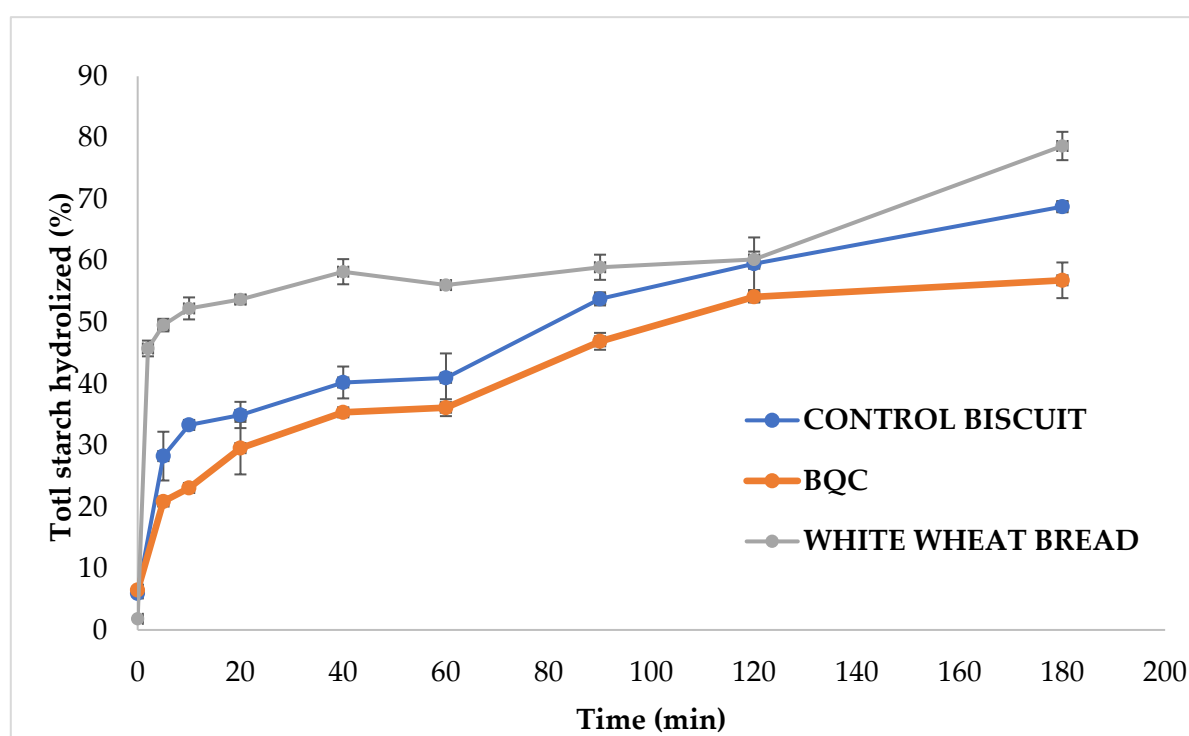


Figure S1. Starch hydrolysis kinetic of control biscuit (100% WF), BQC (15% SQF, 25% SCF, and 60% WF) and white wheat bread (100% WF).

Table S1. Sprouting conditions of cañihua, kiwicha, and quinoa grains.

Grains	Temperature (°C)	Time (h)	Germination Rate (%)
Cañihua	20	72	98
Kiwicha	26	63	100
Quinoa	20	42	95

The optimal germination temperature and time of cañihua, kiwicha and quinoa was established based on previous optimization studies [1-3].

Table S2. Experimental design with three independent variables (blends of three flour types).

Recipe no.	Proportion of Flours ^a		
	Sprouted Pseudocereal Flour 1 (X ₁)	Sprouted Pseudocereal Flour 2 (X ₂)	Wheat Flour (X ₃)
1	15	15	70
2	20	20	60
3	5	20	75
4	20	20	60
5	5	20	75
6	5	20	75
7	20	20	60
8	10	25	65
9	20	5	75
10	20	5	75
11	10	10	80
12	25	10	65
13	20	5	75
14	25	10	65

^a Composition of flour (expressed as %; sum of ingredients = 100%) used in elaboration of biscuit dough: BQK (X₁: sprouted quinoa flour; X₂: sprouted kiwicha flour; X₃: wheat flour), BQC (X₁: sprouted quinoa flour; X₂: sprouted cañihua flour; X₃: wheat flour) and BKC (X₁: sprouted kiwicha flour; X₂: sprouted cañihua flour; X₃: wheat flour).

Abbreviations:

BQC: biscuit formulated with sprouted quinoa, sprouted cañihua and wheat flours; SCF: sprouted cañihua flour; SQF, sprouted quinoa flour; WF: re-fined wheat flour.

References

1. Paucar-Menacho, L.M.; Peñas, E.; Dueñas, M.; Frias, J.; Martínez-Villaluenga, C. Optimizing germination conditions to enhance the accumulation of bioactive compounds and the antioxidant activity of kiwicha (*Amaranthus caudatus*) using response surface methodology. *LWT-Food Sci. Technol.* **2017**, *76*, 245–252, doi:10.1016/j.lwt.2016.07.038.
2. Paucar-Menacho, L.M.; Martínez-Villaluenga, C.; Dueñas, M.; Frias, J.; Peñas, E. Response surface optimisation of germination conditions to improve the accumulation of bioactive compounds and the antioxidant activity in quinoa. *Int. J. Food Sci. Technol.* **2018**, *53*, 516–524, doi:10.1111/ijfs.13623.
3. Abderrahim, F.; Huanatico, E.; Repo-Carrasco-Valencia, R.; Arribas, S.M.; Gonzalez, M.C.; Condezo-Hoyos, L. Effect of germination on total phenolic compounds, total antioxidant capacity, Maillard reaction products and oxidative stress markers in canihua (*Chenopodium pallidicaule*). *J. Cereal Sci.* **2012**, *56*, 410–417, doi:https://doi.org/10.1016/j.jcs.2012.04.013.