Effect of pomelo albedo dietary fiber on the quality of bread

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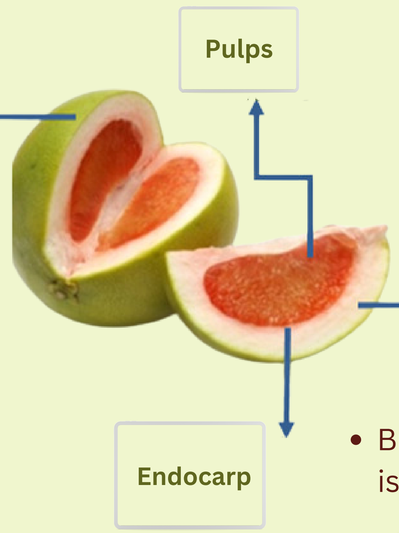
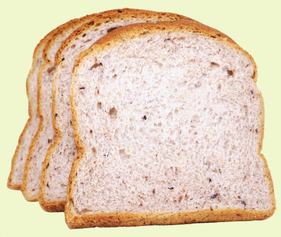
RATIONALE

This research aimed to investigate the effect of dietary fiber from pomelo albedo (PF) to improve the nutritional quality of bread.



- The albedo (spongy white peel) of pomelo, accounting for around 30% of pomelo fruit weight, was usually discarded as waste in the environment.
- Pomelo albedo is an attractive source of cellulose and pectin.
- Bread is a unique and important bakery product. Nonetheless, bread is generally poor in some nutritional components such as dietary fiber.
- This problem can be resolved by incorporating flour from fruits peels such as albedo fiber powder, which can increase the fiber content in bread.

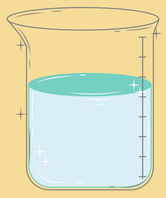


Bread

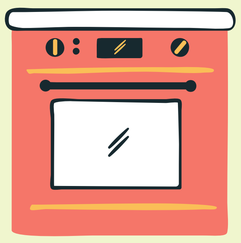
METHODOLOGY

Pomelo albedo

Boiled in water 1 h/ 2 times
water:Pomelo albedo
(5:1)



Soaked with 95% ethanol at 30°C 48 h.
ethanol:Pomelo albedo
(3:1)



Drird PF 65°C 24 h.

Milled and then sieved through an 80-mesh screen

PF powder

Pomelo albedo fiber (PF) extraction

RESULTS

The physicochemical properties demonstrated that the total dietary fiber of PF was approximately 72.74% wb. The water and oil absorptions of PF were 18.26 and 4.28 g/g dry sample, respectively. The emulsion activity and emulsion stability of PF were about 47% and 46%, respectively.

Table 1. Physicochemical properties of dietary fiber from pomelo albedo.

Properties		Values
Chemical composition	Moisture (% wb)	4.42
	Protein (% wb)	4.43
	Fat (% wb)	0.19
	Ash (% wb)	8.49
	Soluble dietary fiber (% wb)	34.30
	Insoluble dietary fiber (% wb)	38.44
Water activity		0.113
Water absorption (g/g dry sample)		18.26
Oil absorption (g/g dry sample)		4.28
Emulsion activity (%)		47.92
Emulsion stability (%)		46.67

The experiment was designed to investigate the effect of PF content (1-5%) on the quality of wheat bread. The sample with no PF was used as a control. Due to the high-water absorption of PF, the amount of water was measured using a Farinograph as required to reach 500 BU of consistency.

Table 2. Effect of PF content on the physical properties of wheat bread.

PF (%)	Specific volume (cm^3/g)	No. of pores^{ns}	Average pore diameter^{ns} (mm)	Uniformity^{ns}	Firmness (N)	Relative elasticity	Total dietary fiber
0	3.14^{a}±0.00	37.75±7.09	4.32±1.38	6.28±1.47	7.98^{d}±0.73	59.31^{d}±0.74	3.96
1	3.12^{a}±0.06	50.75±5.97	4.04±0.76	5.89±1.88	8.42^{cd}±1.71	60.07^{cd}±1.04	5.00
2	3.03^{b}±0.04	48.00±14.00	4.68±1.23	7.02±1.95	9.13^{bcd}±1.58	61.08^{bc}±1.58	6.03
3	2.81^{c}±0.01	48.00±8.29	3.57±0.40	5.72±0.81	9.77^{abc}±1.41	61.20^{ab}±1.31	6.97
4	2.82^{c}±0.03	45.25±14.50	4.86±1.11	7.49±1.78	11.19^{a}±2.45	62.03^{ab}±1.25	7.04
5	2.84^{c}±0.00	49.75±14.97	3.96±1.52	5.65±2.64	10.4^{ab}±1.23	62.26^{a}±0.57	9.02

Different letters (a–d) indicate significant difference between rows ($p<0.05$).
The letters ns indicate significant difference between rows ($p\geq0.05$).

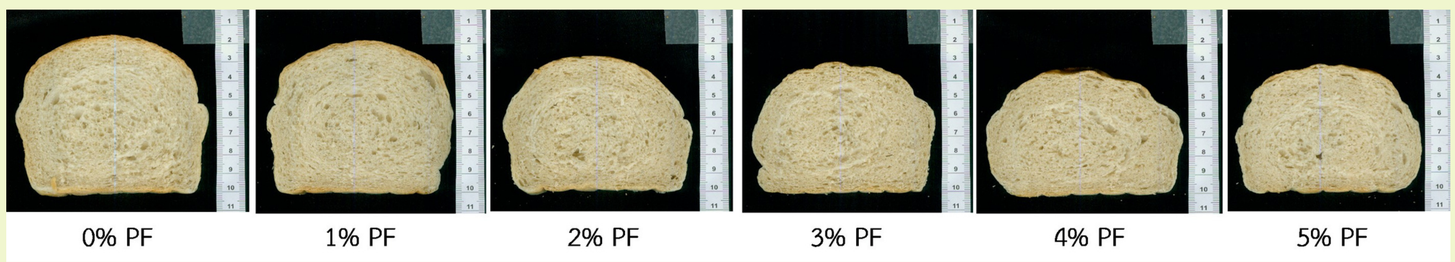


Figure 1. Wheat bread incorporated with different PF (0-5%).

CONCLUSION

The addition of PF in wheat bread for up to 1% did not show a significant difference in loaf-specific volume. The increase of PF significantly increased ($P<0.05$) crumb firmness and REL but had no effect on crumb porosity. The total dietary fiber of bread increased from 3.96 to 9.02% db when the PF was added up to 5%. Overall, PF has the potential usage in bread-making to increase daily fiber intake.

REFERENCE

Sang, J., Wen, J., Li, L., Xu, Y., Gu, Q., Yu, Y. and Peng, J. (2023). Effects of pomelo peel sponge layer insoluble dietary fibre addition on the properties of the dough and bread. *Int. J. Food Sci. Technol., 58,* 2344-2354. https://doi.org/10.1111/ijfs.16364