

# Formulation of new desserts using Oak Fruits

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## Introduction

In the context of the increased recognition of the nutritional properties of all nuts, acorns have recently become the object of renewed interest being nutritious fruits (Pasqualone et al., 2019) and are nutritionally comparable to many cereal grains with 58% starch content, fats, fibers, contain proteins, high content of essential amino acids, vitamins (mostly A and C), and minerals (Vinha et al., 2016). Acorn flour is also gluten free (Vinha et al., 2016) making it an alternative for celiac patients.

This study aims to incorporate oak fruits into human food through the formulation of new desserts.



**Figure 1.** Acorn powder obtained from dried shelled acorns at 40°C/5 days. Acorns were collected in late November 2019 from a cork oak (*Quercus suber* L.) forest (Beni M`Tir) situated in Northwestern Tunisia.

## 3. Formulation of desserts

Four formulations were tested and evaluated by sensory analysis.

Formulation A: 54% acorns, water and sugar; Formulation B: 49% acorns, water, sugar; Formulation C: 43% acorns, water, sugar, 6% cocoa powder; Formulation (D): 38% acorns, water, sugar, 11% sesame paste.

## 4. sensory analysis

A descriptive profiling was carried out by testing several descriptors such as: color, appearance, smell, sweetness and texture. The tasting panel was made up of 4 groups of 30 amateur random assessors. The percentage of acceptability of the 4 formulation desserts was determined for each group.



**Figure 3.** The 4 tested formulations of dessert

## Conclusion

The best method that eliminates astringency by boiling the acorns.

For the tasters, the best desserts were those including, cocoa powder and sesame paste to acorns (Stiti et al., 2022).

Bringing light on the use of acorns for edible purposes could increase their economic value and contribute to enhance local population income which has a positive impact on forest sustainability.

## Material and methods

### 1. Composition physico-chimique

Percent moisture(%) was quantified using whole acorns. The other compounds were determined from dry acorn flour (figure 1). A sample of 2 kg of acorns was used to determine acidity, oil content by using sowslet. Total phenols were determined as well as tannins and flavonoid contents. Antioxidant activity was also measured (DPPH).

### 2. Preparation of acorns for the formulation of desserts

To reduce the tannins content, 4 methods have been tested on peeled acorns (figure 2). A preference test was carried out on the 4 produced samples by 4 lots of 30 amateur random tasters.

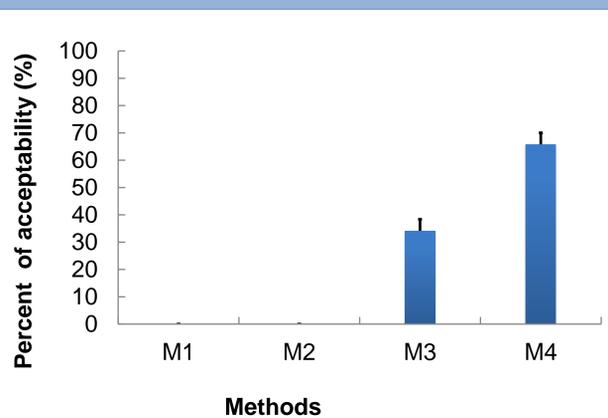


**Figure 2.** The 4 methods of tannin reduction. M1 : soaking in water (48 hours), M2 : soaking in water soaked and baking soda (48 hours), M3: Oven (180°C/15minutes), M4 : boiling and changing water until clarity.

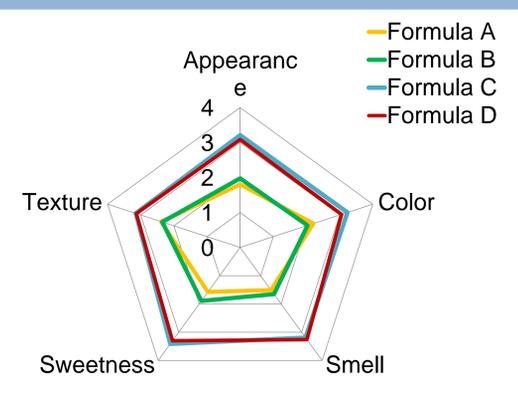
## Results

**Table 1.** Physico-chemical composition and DPPH radical scavenging activity of cork oak acorns

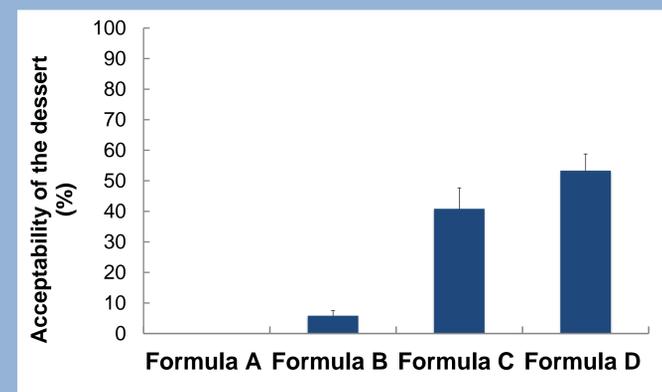
Water content	Lipids	PH	Polyphenols	Flavonoids	Tannins	DPPH
44.72±0.89	1.33±0.3	5.54±0.4	433.4 ±44.76	0.006±0.0009	35.95±29.22	37.73±13.08
(% FM)	(% DM)		(mg/ml EAG)	(mg/ml ER)	(mg/ml EC)	% DM



**Figure 4.** Percentage of acceptability of tasters for acorns produced by the 4 methods



**Figure 5.** The sensory profiles of the 4 formulations



**Figure 6.** The percentages of acceptability for the 4 formulations

## References

- Pasqualone A, Makhoul FZ, Barkat M, Difonzo G, Summo C, Squeo G, et al. Effect of acorn flour on the physico-chemical and sensory properties of biscuits. *Heliyon*. (2019) 5:e02242. <https://doi.org/10.1016/j.heliyon.2019.e02242>
- Stiti B, Mezni F, Zarroug Y, Slama A, Fkiri S, et al. 2022. Agri-Food Valuation of Oak Fruits in Human Consumption: Formulation of Desserts. *J Food Chem & Nanotechnol* 8(2): 38-42. <https://doi.org/10.17756/jfcn.2022-124>
- Vinha AF, Costa ASG, Barreira JCM, Pacheco R, Oliveira MBPP. 2016. Chemical and antioxidant profiles of acorn tissues from *Quercus* spp.: potential as new industrial raw materials. *Ind Cro Prod* 94:143-151. <https://doi.org/10.1016/j.indcrop.2016.08.027>.