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Development of agri-food uses of *Q. canariensis* acorns: *The first study of this plant native of Tunisia*

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The issue: Non-timber forest products are the most exploited resources of Tunisian forests. Some of these products remain, despite their availability, very little valued by both local populations and industrialists. This is notably the case for the acorns of the Zeen oak (*Q. canariensis)*. This NWFP is not valued and no industrial development is carried out, either for human or animal consumption. My Mobi-doc project, supervised by INRGREF (research actor) and GSA (industrial actor), aims to valorize the acorns of the Zeen oak, as a local product, by developing their use in the food industry.

Keywords: Zeen oak (*Q. canariensis*) ; Food industry; Acorns; Flour

Material & Methods

1/ Acorns of *Quercus canariensis* were collected from North western Tunisia forests in November 2020.

2/ The acorns were sorted

3/ The acorns were dried

4/ Acorns were shelled

5/The acorns were grounded

6/ Cake was prepared

Several investigations were carried out:

- **Biochemicals analysis: Polyphenols**, **Flavonoids**, **Tannins** and **Phenolic profile** (HPLC) were measured.
- **Bioactivities: Antioxidant capacity (**FRAP and DPPH assay) and **Antibacterial activity** were performed.
- **Nutritional values: Minerals**, **fats, proteins, α-tocopherol** and **Vitamin C** were performed.

- **Gluten-free cake** and **degustation** **at the International Agriculture Forum**

Results & discussion

Table 1. Biochemicals composition of acorns flour of *Q. canariensis* Willd.

	mg GAE/g DW	mg RE/ g DW	µg CE/g DW	Coumarine (%)	Gallic acid (%)
Acorns flour	9.53±0.06	1.18±0.04	1.75±0.00	31.37±0.00	20.52±0.00

- Chemicals analysis showed the richness of acorns flour of **polyphenols**, **tannins** and **flavonoids**. In addition, **Coumarin** was the major phenolic compounds quantified in *Q,canariensis* acorns flour (31%) (**table 1**).

Table 2. Bioactivities of acorns flour of *Q. canariensis* Willd.

	IC50 (mg/ml)	DPPH (mg/ml of the extract)	FRAP mg BHTE/g DW (mg/ml of the extract)	Antibiofilm activity against E.coli (%)	MIC of E. coli (µg/ml)	Lysozyme activity against S. aureus (UA/min)
Acorns flour	74,67	50.9±0.02	74,67±0.02	18.71±0.04	468±0.2	1.03±0.1

- The extracts of acorns flours showed very significant **antioxidant, antibacterial and biofilm activities** (**table 2**).

Table 3. Nutritional values of acorn of acorns flour of *Q. canariensis* Willd.

	Potassium (K) (mg/g DM)	Fats (%)	Total Proteins (%)	α-tocopherol (mg/kg)	Vitamin C (mg/100ml)
Acorns flour	6.89±0.3	1.8	3.18±0.2	57.67±0,04	23.16

- Results showed the richness of zeen oak acorns in **potassium** (6.89 mg/g DW) **fats** (1.8 %) and **proteins** (3.18%) (Table 1). Acorns flour of this species is rich in **vitamin C** (26,16 mg/100ml) and **α-tocopherol** (57,7 %) (**table 3**).

Conclusion

- This investigation showed the richness of *Q, canariensis* acorns flour as a nutrient, natural antioxidant, antimicrobial and anti-biofilm. Thus, acorns flour could be a promising new gluten-free product and bio-based food additive for the benefit of households in forest areas and food industries.