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Bioactive phytochemicals from unexploited *Lotus creticus* L. seeds: A new raw material for novel ingredients

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ABSTRACT

Lotus creticus L. (Fabaceae) is largely grown in the Mediterranean zone and considered as a socioeconomic and ecologically valuable species in the rural and arid Tunisian regions. In the present work, we focused on the unexploited seeds of four ecotypes of this plant regarding their storage proteins, phytochemicals, and antioxidant potential. Both colorimetric assays and electrophoretic analysis revealed that *L. creticus* seeds are promising sources of protein and their total contents were in the range of 197.55–248.27 mg/g DW. Albumins constituted the major fraction and formed about 45.08% of total proteins, followed by globulins (27.32%), and glutelins (19.38%). The prolamin fraction presented only 8.22%. The methanolic extracts of the seeds were rich in phenolics. The total polyphenol and flavonoid contents were found to be in the range from 7.05 to 8.11 mg GAE/g DW and 11.83 to 14 mg QE/g DW, respectively, whereas the condensed tannin amounts ranged between 1.78 to 2.19 mg CTE/g DW. Moreover, the studied seeds extracts possessed high antioxidant potential as evidenced by their total antioxidant capacity (6.74–8.11 GAE/g DW), free radical DPPH scavenger activity (IC_{50} = 15.67–22.17 mg/mL), and reducing power (EC_{50} = 6.90–9.07 mg/mL) which were mainly due to the presence of several phenolics in the extracts. A total of 21 phenolics were identified and quantified using LC-ESI/MS method including 8 phenolic acids (31.81–33.83 μg/g DW) and 13 flavonoids (108.10–120.02 μg/g DW). Quinic acid, protocatechuic acid, epicatechin, hyperoside, and quercetin-3-*O*-rhamnoside were identified as the predominant compounds. Results so far have been very encouraging and proved that *L. creticus* seeds are an effective source of phenolics and proteins which could potentially be used for several industrial purposes.

1. Introduction

Lotus creticus L. is a perennial species that belongs to the Fabaceae family and being tolerant to salinity, drought, and severe winds characterizing Mediterranean areas from semi-arid to lower arid bioclimatic stages (Morales et al., 2000; Rejili et al., 2007). It plays a primordial role in preservation and protection of ecosystems (Escaray et al., 2012; Vignolio et al., 2005) therefore, it is widely used "in revegetation and landscaping projects" in dry and saline environments (Tlili et al., 2018; Escaray et al., 2010; Beslesky, 1999). In folk medicine, the genus *Lotus* is widely used as prophylactics, contraceptives, treatment of peptic ulcers and sexually transmitted disorders (Alqasoumi et al., 2013). Indeed, the extracts of the aerial part showed high antibacterial and antifungal activities (Mahasneh, 2002). Besides, recent evidence showed that the *Lotus* genus is rich in several bioactive compounds such as caffeic acid, chlorogenic acid, p-hydroxybenzoic acid, gallic acid (Araniti et al., 2014), and coumestan (Mahmoud et al., 1990). Similarly, Barreira et al. (2017) showed that *L. subbiflorus* Lag. and *L. conimbricensis* Brot. leaves contained high isoflavone contents, especially biochanin A. Recent evidence proved that *L. creticus* seeds are rich in free amino acids, canavanine, arginine, asparagine, and aspartic acid (Megias et al., 2016).

Generally, legume seeds represent a vital source of vitamins, minerals, proteins, and bioactive compounds (Magalhaes et al., 2017). The increasing worldwide consumption of legumes with decreasing agricultural areas and water availability is becoming a serious problem.

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