

# CHEMICAL COMPOSITION OF CRUDE EXTRACTS FROM THE SPECIES *ONONIS MITISSIMA* L.

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## 1 INTRODUCTION

The genus *Ononis* L. is one of the most important genera of the family Fabaceae, with about of 75 species distributed mainly in Mediterranean region, Canary Islands, Europe and Central Asia [1-2]. Previous phytochemical investigations focused on species of the genus *Ononis* revealed the presence of various classes of secondary metabolites such as sugar, tannins, saponins, flavonoïds, phenolic acids, essential oils, sterols, triterpenoïds and coumarins [3-7]. This first phytochemical investigation of *Ononis mitissima* L. growing in Algeria, allowed the isolation and characterization of five flavonoïds namely: formononetin (1), genkwanin (2), velutin (3), ononin (4) and quercetrin (5). Their structures were elucidated by spectroscopic analysis (<sup>1</sup>H, <sup>13</sup>C, COSY, HSQC, HMBC and NOESY), spectrometry (ESI-MS) and comparison with literature data. The total phenolic and flavonoïd contents were estimated by the Folin-Ciocalteu and AlCl<sub>3</sub> methods and the antioxidant activity of ethyl acetate extract was evaluated by two methods including ferric reducing antioxidant power and total antioxidant capacity. The powerful antioxidant activity of EtOAc extract could be related to its greater phenolic and flavonoïd contents and the presence of flavonoids, which are known for their important antioxidant capacity.

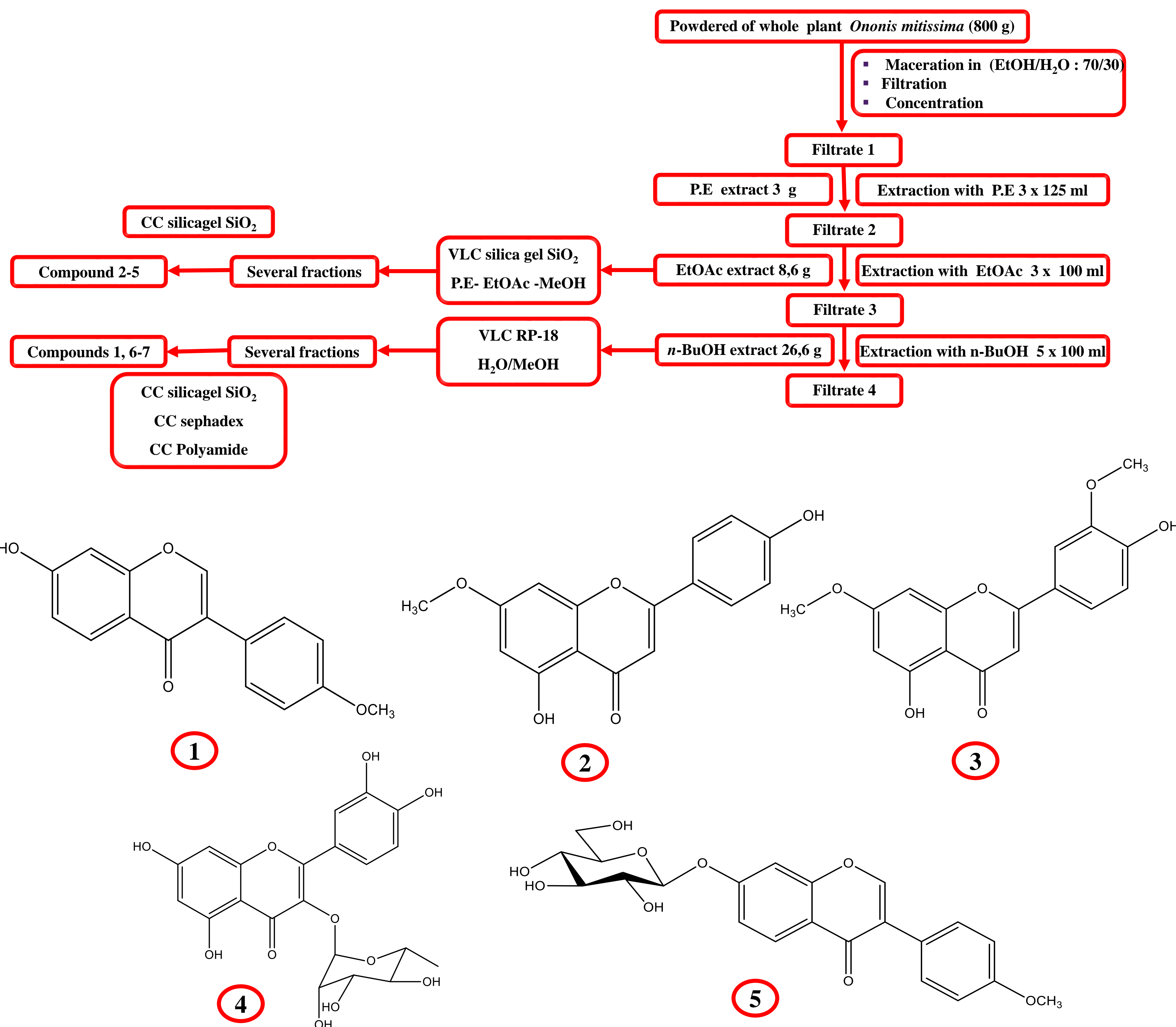
## 2 BOTANICAL DESCRIPTION

The species *O. mitissima* is an annual plant, erect or ascending, glabrescent, not spiny. It is very common in the Mediterranean region of Europe, Asia and Africa <sup>(2)</sup>



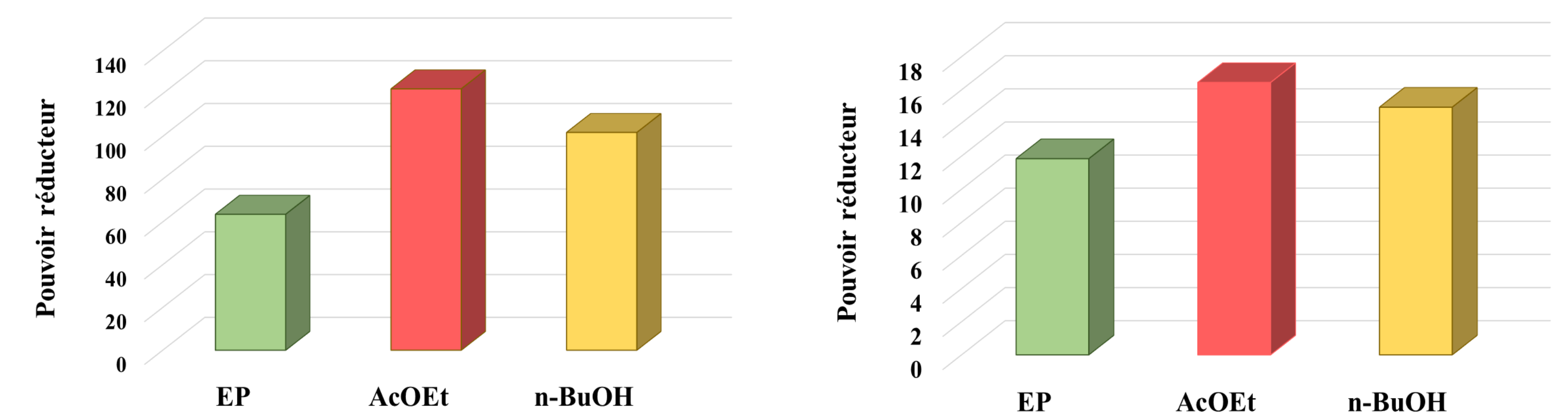
Kingdom:	Plantae
Branch:	Spermatophyta
Class:	Eudicotyledonae
Order:	Fabidées
Family:	Fabaceae
Subfamily:	Papilionoideae
Genus:	<i>Ononis</i> .
Species:	<i>Ononis mitissima</i> L.

## 3 EXTRACTION AND ISOLATION



## 4-2 FRAP AND PPM ACTIVITIES

The antioxidant activity of the extracts was calculated from the regression equation of the straight line determined by the ascorbic acid. The values are expressed with ( $\mu$ g Eq of ascorbic acid per mg of extract). The EtOAc extract displayed the highest antioxidant activity, in ferric reducing antioxidant power and total antioxidant capacity with values of  $122.23 \pm 0.014$  and  $16.44 \pm 0.0012$   $\mu$ g EAA/mg ex compared to the results of *n*-BuOH and PE extracts.



## 5 CONCLUSION

This study is focused on the phytochemical and the biological activities of *Ononis mitissima* L., which is so rich in flavonoïd derivatives, phenolic acids, anthranilic acid and resorcinol derivatives, aromatic lactones and coumarins. This investigation led to the isolation by chromatographic methods and characterization by spectroscopic methods including NMR 1D and 2D, mass spectrometry (ESI-MS), UV, and by comparison with the literature data. of five secondary metabolites type isoflavonoïds and flavanone from the ethyl acetate and *n*-BuOH extracts of *O. mitissima*. The antioxidant activity was evaluated by two different methods: ferric reducing power and ferric thiocyanate assay. The results of the antioxidant activity revealed that the EtOAc extract displayed the highest antioxidant activity, in ferric reducing antioxidant power and total antioxidant capacity with values of  $122.23 \pm 0.014$  and  $16.44 \pm 0.0012$   $\mu$ g EAA/mg ex compared to the results of *n*-BuOH and PE extracts. It can be concluded that *Ononis mitissima* L. extracts might be an interesting alternative for future applications as a source of antioxidants.

## 4 RESULTS AND DISCUSSION

### 4-1 TOTAL PHENOLIC AND FLAVONOID CONTENTS

Extrait	EP	AcOEt	<i>n</i> -BuOH
Total phenolic content ( $\mu$ g GAE/ mg of plant extract)	$52.11 \pm 0.65$	$177.96 \pm 0.16$	$157.10 \pm 0.24$
Total flavonoids content ( $\mu$ g QE/ mg of plant extract)	$27.27 \pm 0.41$	$132.83 \pm 0.32$	$117.95 \pm 0.61$

## 6 REFERENCES

- [1] Willis, J. C., 1973. A dictionary of the flowering plants and ferns, 8th Ed. Cambridge University Press.
- [2] P. Quezel, S. Santa, Nouvelle flore de l'Algérie et des régions désertiques méridionales, Vol. 1, CNRS, Paris, (1963), p. 483.
- [3] S. Al-Khalil, A. Masalmeh, S. Abdalla, H. Tosa, M. Iinuma, 1995. N-arachidylanthranilic acid, a new derivative from *Ononis natrix*. Journal of natural products, 58(5), 760-763.
- [4] L. Khouni, C. Long, H. Haba, N. Molinier, M. Benkhaled, 2014. Anthranilic acid derivatives and other components from *Ononis pusilla*. Natural product communications, 9(8).
- [5] B. Klejdus, J. Vacek, L. Benešová, J. Kopecký, O. Lapčík, V. Kubáň, 2007. Rapid-resolution HPLC with spectrometric detection for the determination and identification of isoflavones in soy preparations and plant extracts. Analytical and bioanalytical chemistry, 389(7-8), 2277-2285.
- [6] B. Klejdus, J. Vacek, L. Lojkova, L. Benešová, V. Kubáň, 2008. Ultrahigh-pressure liquid chromatography of isoflavones and phenolic acids on different stationary phases. Journal of Chromatography A, 1195(1-2), 52-59.
- [7] D. Benedec, L. Vlase, I. Oniga, A. Toiu, M. Tamas, B. Tiperciuc, 2012. Isoflavonoids from *Glycyrrhiza* sp. and *Ononis spinosa*. Farmacia, 60(5), 615-620.