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Punica granatum l. Fruit parts from Algerian cultivar bioactive compounds and *in vitro* biological activities: a comparative study

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Abstract: Fruits are a source of antioxidant compounds, such as phenolis vitamins and carotenoids, which contribute to their chemo preventive potential. The mentioned compounds, which scavenge free radicals, may reduce the level of oxidative stress and prevent the oxidation of biomolecules, that would break the reaction chains of pathogenesis in the deterioration of physiological functions, which could occur in the coronary heart diseases and cancer. Apart from their biological properties, natural antioxidants are also of interest in the cosmetic, pharmaceutical and especially in food industries, since they can be also used as natural antioxidants, Nutraceuticals, prebiotics, dyes.

The present work evaluated phenols, and flavonoids contents (quantity) of organic pomegranate juice, peel and seeds cultivated in the Northeastern part of Algeria, *in vitro* antioxidant activity, using: CUPRAC, GOR, PHENYL, DPPH, ABTS assays and enzymatic activity: α-glycosidase were also investigated and confirms traditional uses of pomegranate parts. Furthermore, a comparative study of all these essays on different pomegranate's parts tests will be given.

However, further investigations should assessed safety of by products "seeds, arils and peels" at efficient but non toxic doses, if we want to added value in our daily feeding.

Keywords: *Punica granatum* L. ; Traditional medicine; Bioactive com *in vitro* Biological activities.

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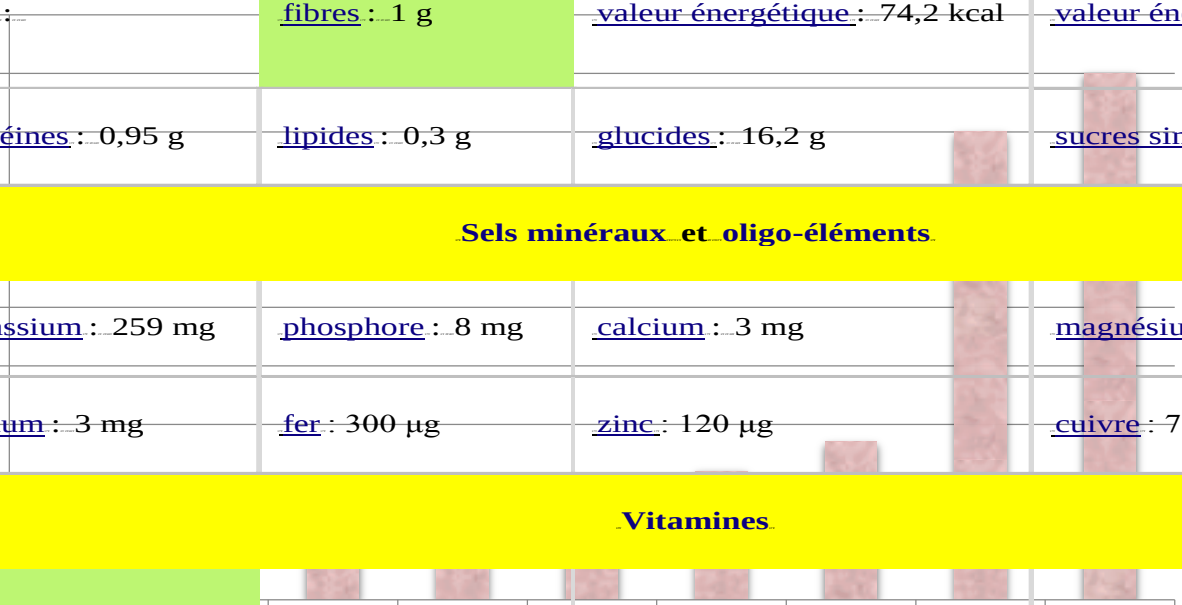
Production de grenade

Composition chimique et valeur nutritionnelle

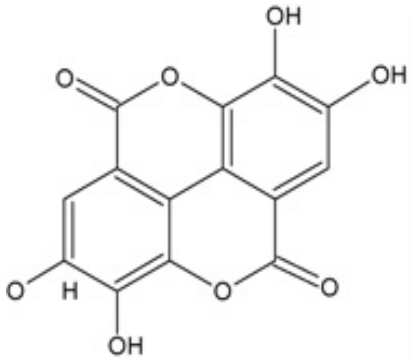
Grenade fraîche, pulpe et pépins (d'après anses [8], valeur nutritive pour 100 g)			
eau :	fibres : 1 g	valeur énergétique : 74,2 kcal	valeur énergétique : 315 Kj
protéines : 0,95 g	lipides : 0,3 g	glucides : 16,2 g	sucres simples : 16,2 g
Sels minéraux et oligo-éléments			
potassium : 259 mg	phosphore : 8 mg	calcium : 3 mg	magnésium : 3 mg
sodium : 3 mg	fer : 300 µg	zinc : 120 µg	cuivre : 70 µg
Vitamines			
vitamine C : 11,4 mg	vitamine B1 : 30 µg	vitamine B2 : 30 µg	vitamine B3 (ou PP) : 300µg
vitamine B5 : 590 µg	vitamine B6 :200µg	vitamine B9 (folate) : 6 µg	vitamine B12 : 0 µg
bêta-carotène : 20 µg	rétinol : 0 µg	vitamine E : 0,55 mg	vitamine D : 0 µg



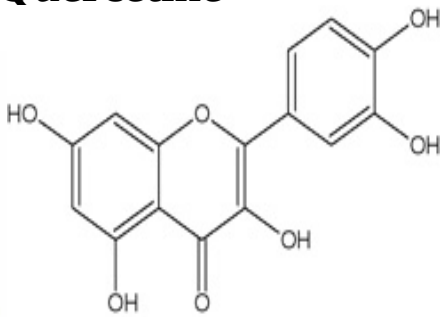
Les plus grands pays producteurs de grenades au monde

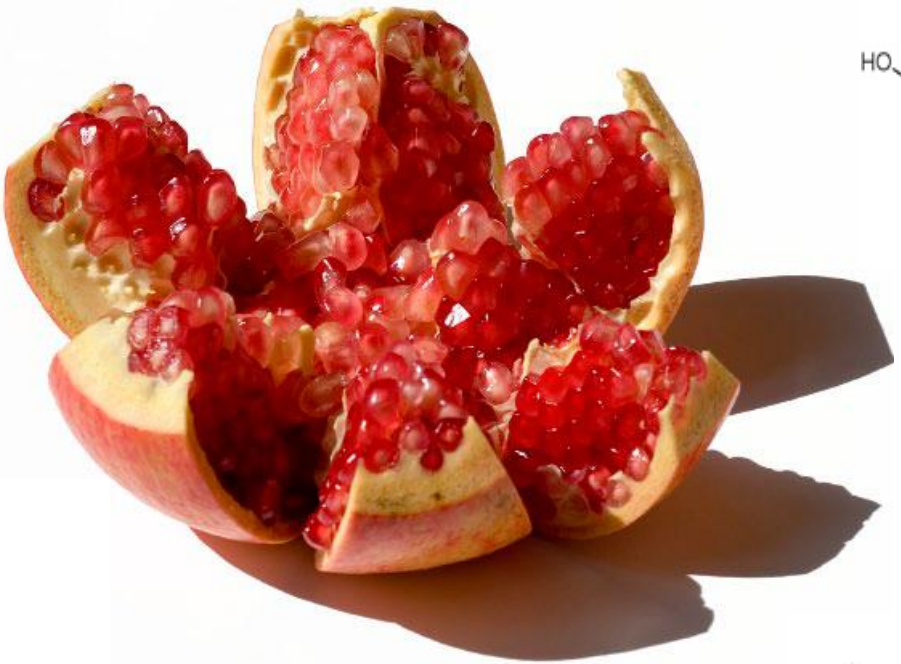
Composition

Acide gallique

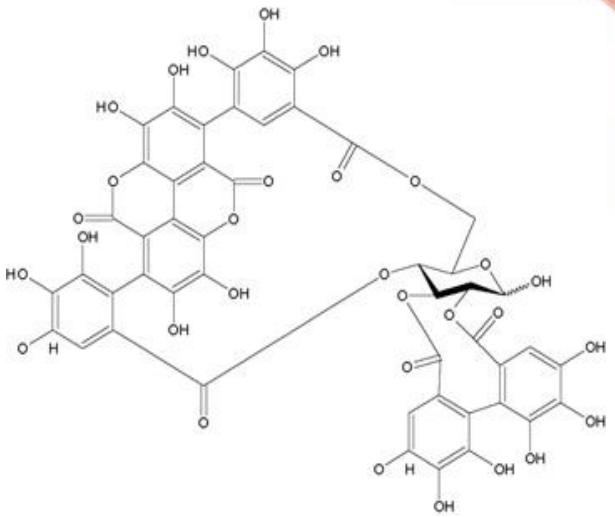


Quercétine

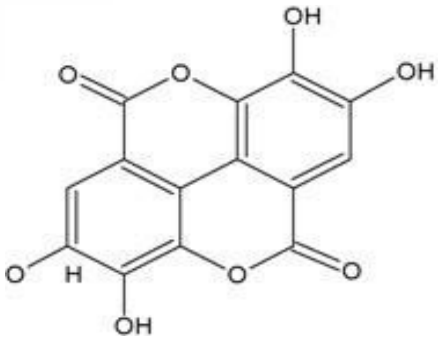




Punicalagin



Acide Ellagique



Theapeutic effect

↗ L'absorption
↘ L'excrétion fécale du cholestérol
Ratios total LDL/HDL

Anti-diabétique

- Plaque d'athérome

Protecteur cardiovasculaire

- Protéines régulatrices de l'apoptose

Anticancer

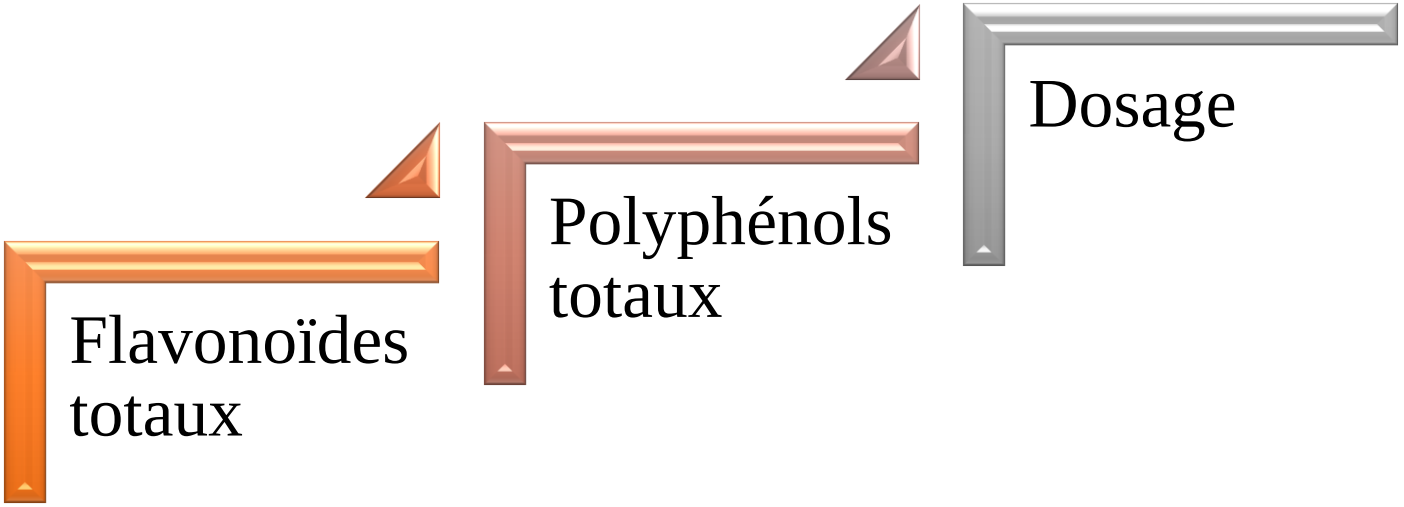
- Protéines et enzymes pro-inflamatoire

Anti-inflammatoire

- Protéine β amyloïde

Alzheimer

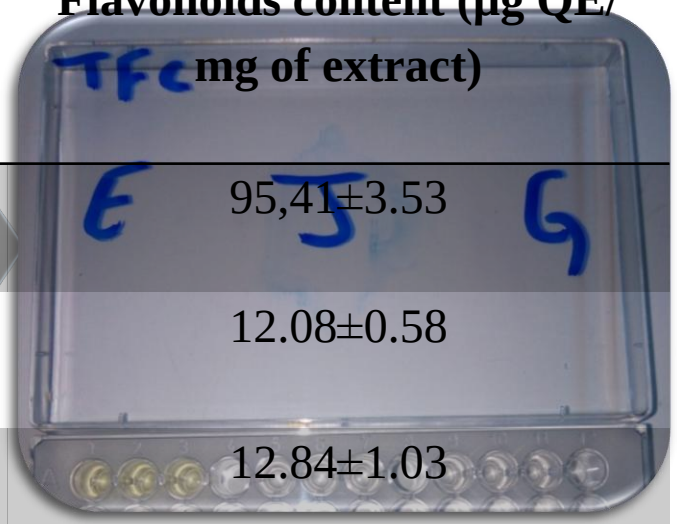
RESULTS AND DISCUSSION



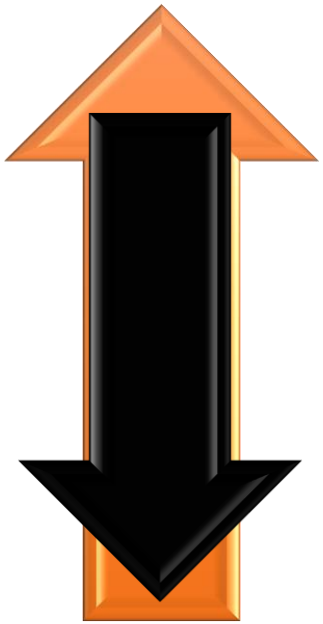
Extrait	Total phenolic compounds content (µg GAE/ mg of extract)	Flavonoids content (µg QE/ mg of extract)
E	699,29±0.00	95,41±3.53
J	60.27±23.42	12.08±0.58
G	28.01±11,53	12.84±1.03

TPC

TFC



Evaluation of *in vitro* biological activities



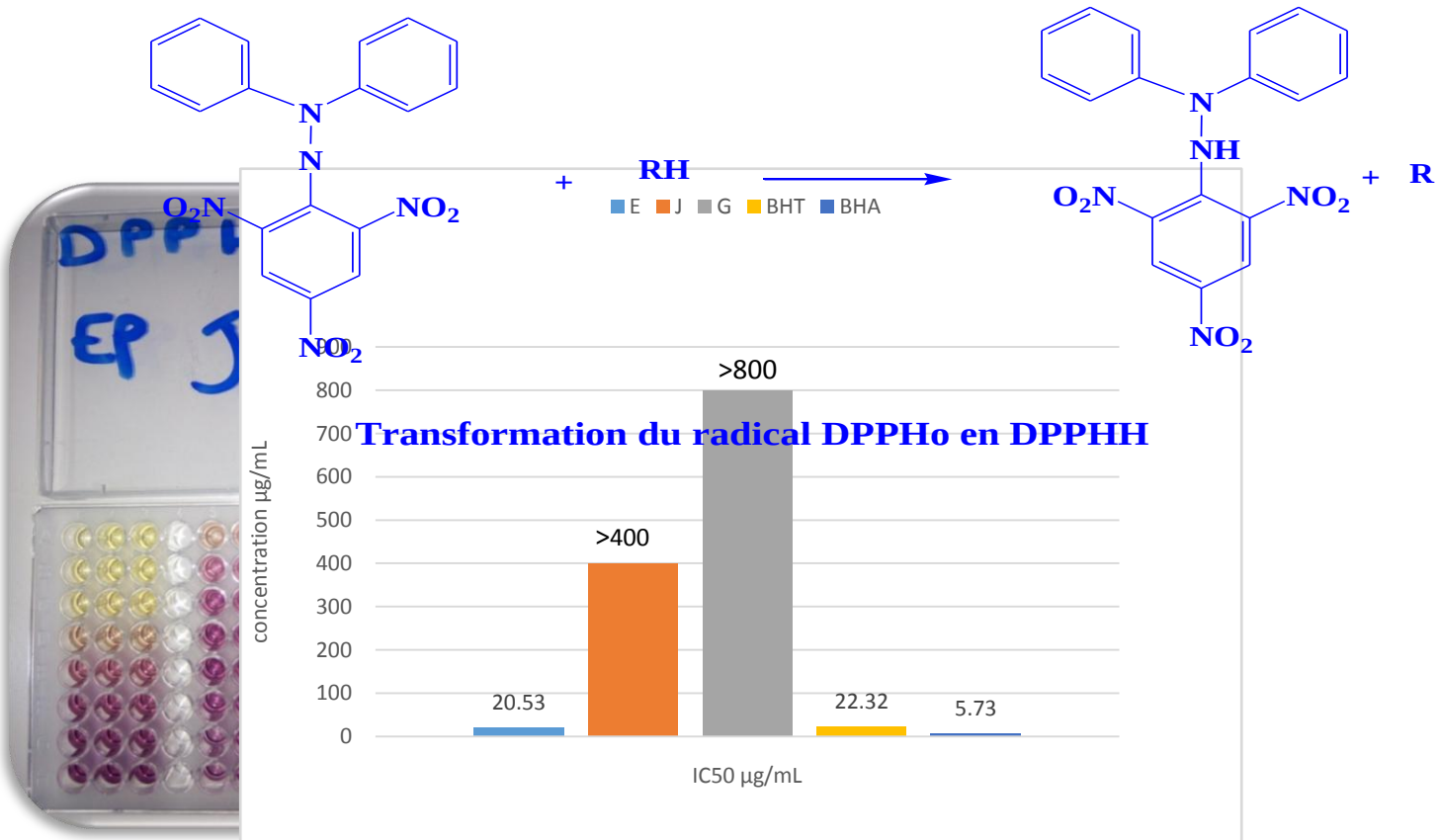
Activité Antioxydante

Activité Enzymatique

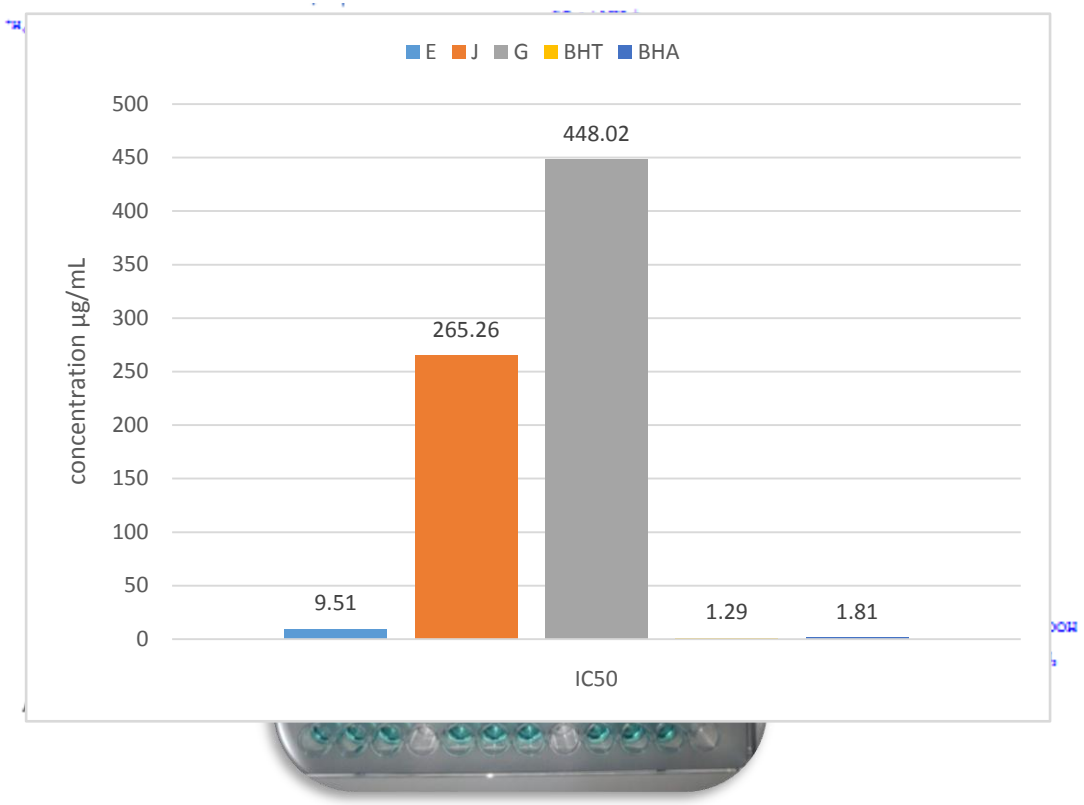
- Test **DPPH**
- Test **ABTS**
- Test **FRAP**
- Test **CUPRAC**
- Test du **Pouvoir réducteur**
- Test de **Penanthroline**

- Activité **anti-Alzheimer (AChE)**
- Activité **antidiabétique**
- Activité **antityrosinase**

DPPH TEST


+ RH
E J G BHT BHA
+ R
Transformation du radical DPPHo en DPPHH
concentration µg/mL
800
700
600
500
400
300
200
100
0
>800
>400
20.53
22.32
5.73
IC50 µg/mL

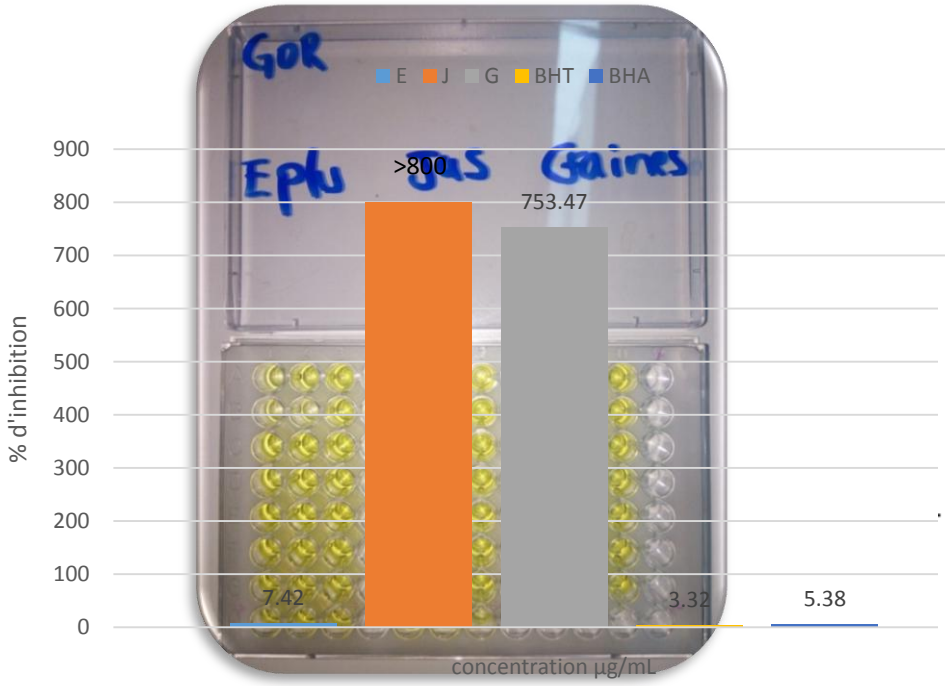
ABTS TEST

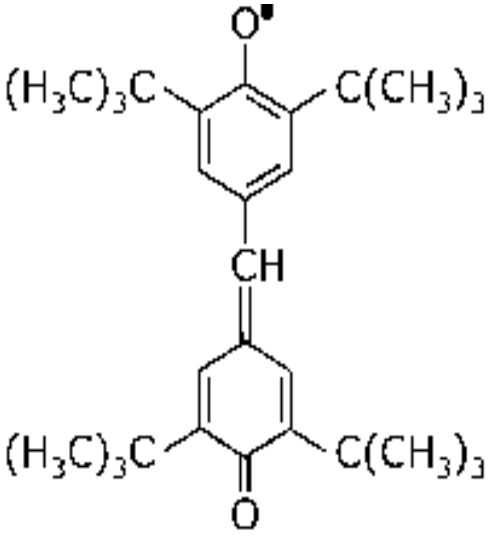

E
J
G
BHT
BHA
500
450
400
350
300
250
200
150
100
50
0
concentration µg/mL
448.02
265.26
9.51
1.29
1.81
IC50

GOR TEST

radical galvinoxyle → piégeage du radical galvinoxyle

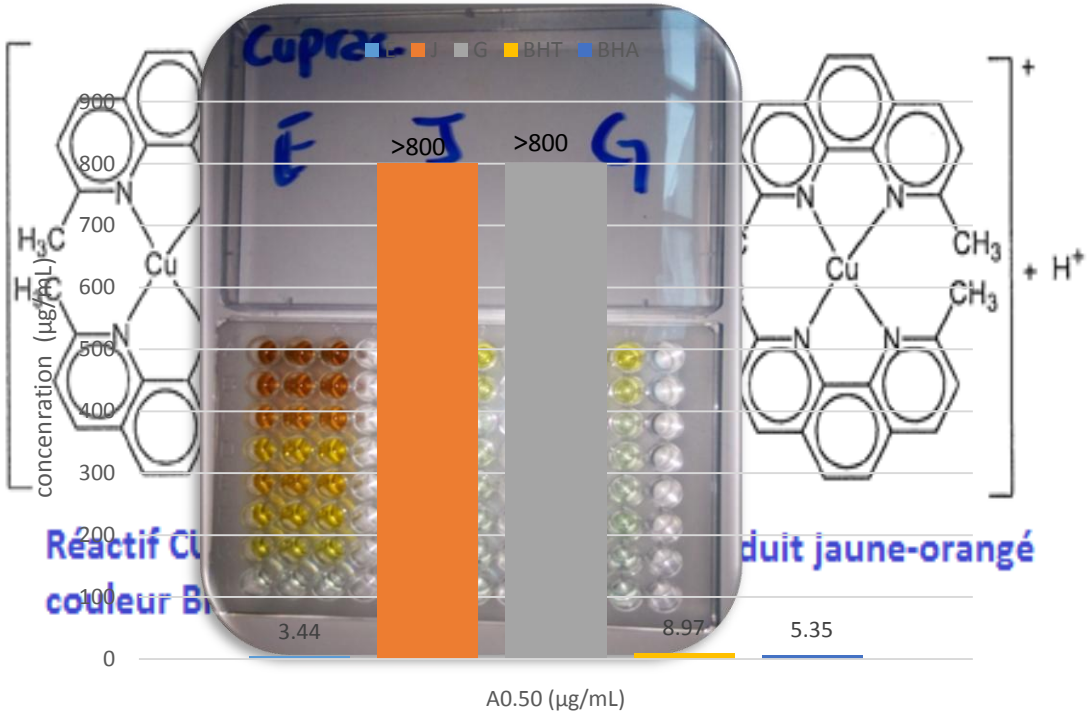
antioxydant (H+)





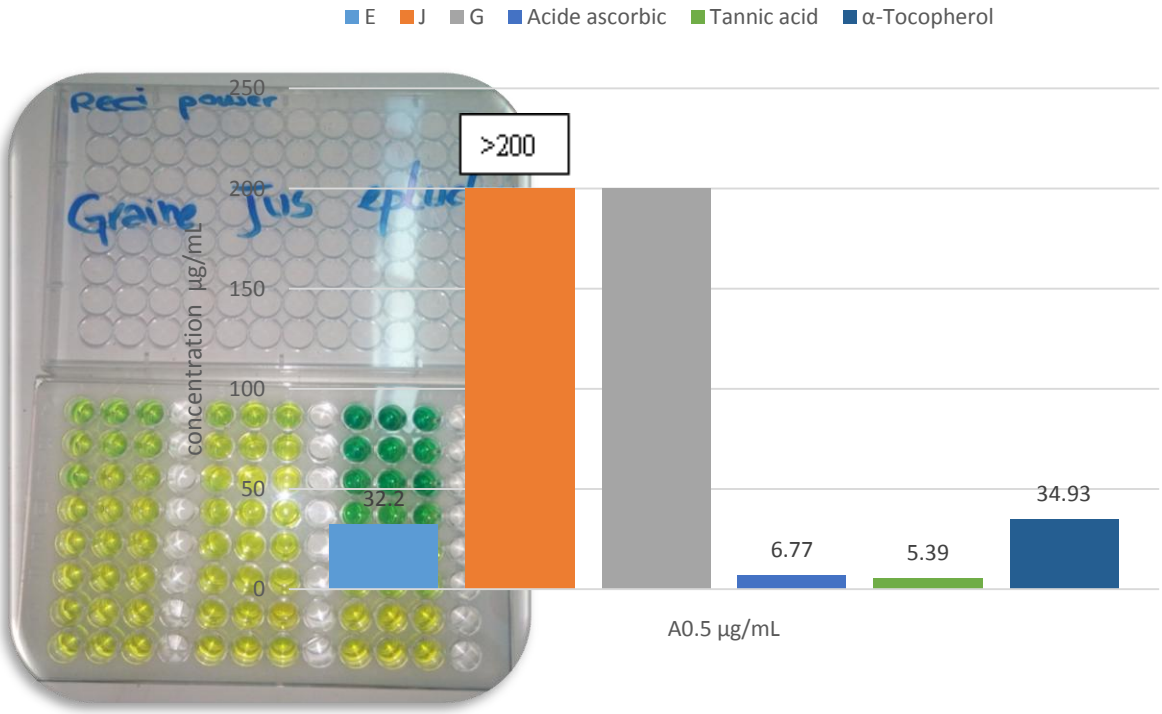
galvinoxyl radical

CUPRAC TEST


Cuprac
L J G BHT BHA
F
J
G
>800
>800
concenration (µg/mL)
900
800
700
600
500
400
300
200
100
0
3.44
8.97
5.35
A0.50 (µg/mL)
Réactif Cu
duit jaune-orangé
couleur B
H3C
CH3
Cu
N
+ H+

REDUCING POWER

- Réduction complexe/ Fe^{3+} → fer ferreux Fe^{2+}
- antioxydant (e−)



REDUCING POWER

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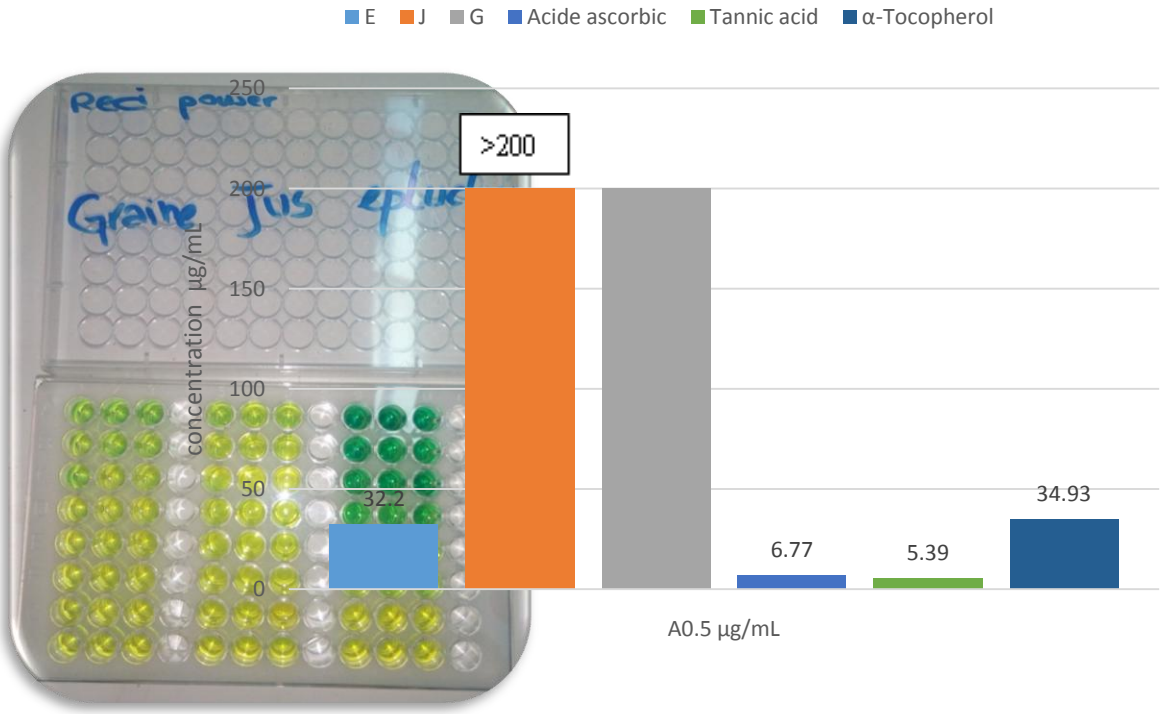
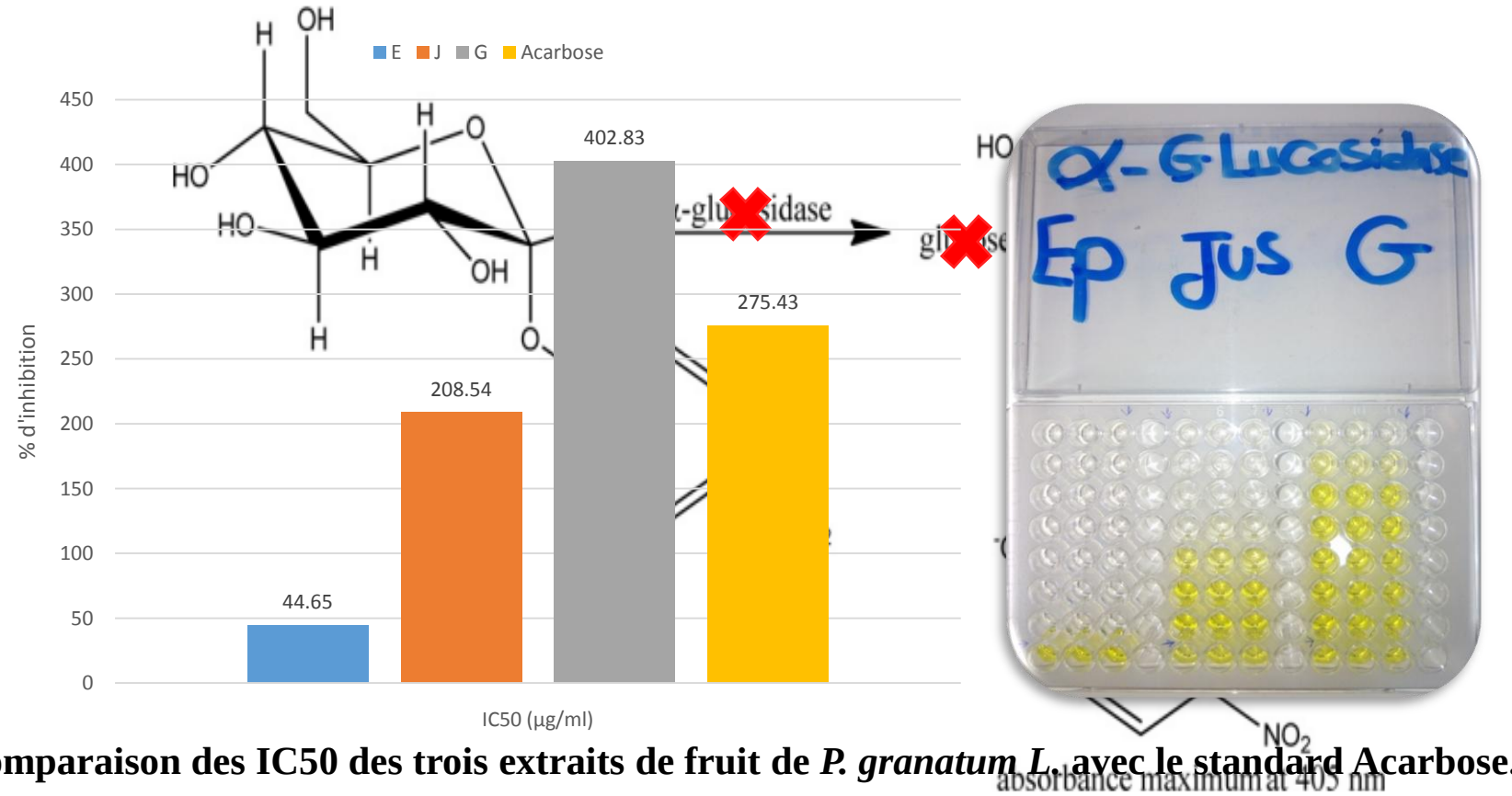


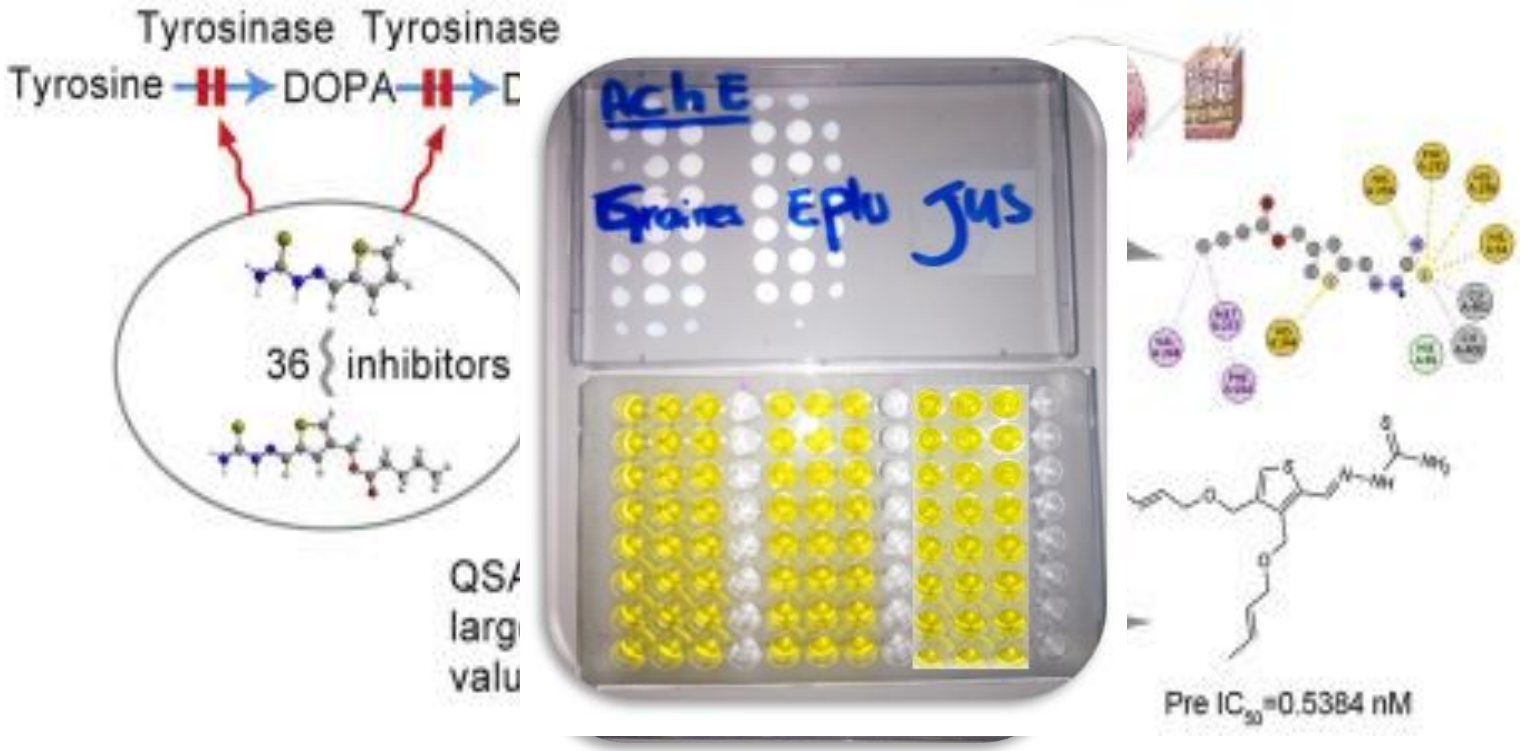
-α glucosidase Inhibiting activity



Comparaison des IC50 des trois extraits de fruit de *P. granatum L.* avec le standard Acarbose.

Other tests

- ✓ Anti-tyrosinase
- ✓ Anti-Alzheimer



Conclusions The properties of pomegranate depend on cultivars and growing locations. Bioactive components of pomegranate fruit are attractive potent targets for the scientific community to develop novel food products for treatment/prevention of chronicle diseases. This study highlighted, Constantine cultivar (Algeria) among the best cultivars in the world and also pomegranate peels as the richest sources of phenols and glycemic regulator, these by-products can be used to produce several economic and agri-waste management benefits. Therefore, The functional properties that were demonstrated for the pomegranate could stimulate agri-waste especially peel promotion which should be used as alternative source of natural antioxidant and glycolic regulator in food and non-food products.

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