Opuntia ficus-indica a Mediterranean diet product .

Toma Nardjes Mouas [1,*], Zahia Kabouche [1], Nibel Bellal [2] and Lina Chertout[2]

[1] Université frères Mentouri-Constantine1, Laboratoire d'Obtention de Substances Thérapeutiques LOST, Campus Chasbet Ersas, 25000 Constantine, Algeria;

[2] Constantine 25000, Algeria;

•Corresponding author: mouas.toma.nardjes@umc.edu.dz

Laboratoire d'Obtention
de Substances Thérapeutiques

Abstract: During last decades, several researches and scientific studies were conducted on the « *Pontiac ficus indica* » a wild edible plant which the fruit is commonly known as prickly pear, promoting its nutritional value, due to a rich composition in polyphenols, polyunsaturated fatty acids, vitamins and amino acids. The current work intends to highlight uses of hole plant parts in different fields such as medical field including anti-inflammatory, antioxidant, antibacterial, antiulcer, dietetic, anticance r and antidiabetic activities. *Pontiac ficus indica* is also wildly used in the culinary field as jam and food coloring; in the agronomic and ecological field as regenerator of exhausted soils; as supplement in fodder use, and in dermacosmetics and parapharmaceutical industry in shampoo and anti-wrinkle skin creams.
However, the use of this plant remains very limited. Consequently, this work is a global revue came to open the way for other more targeted investigations, particularly in Biotechnology.

Keywords: *Pontiac ficus indica,* chemical composition, nutritional value, biological activities.

Introduction

Faible consommation de la viande rouge et de confiserie.

Consommation modérée de poisson, des noix, et huile d'olive.

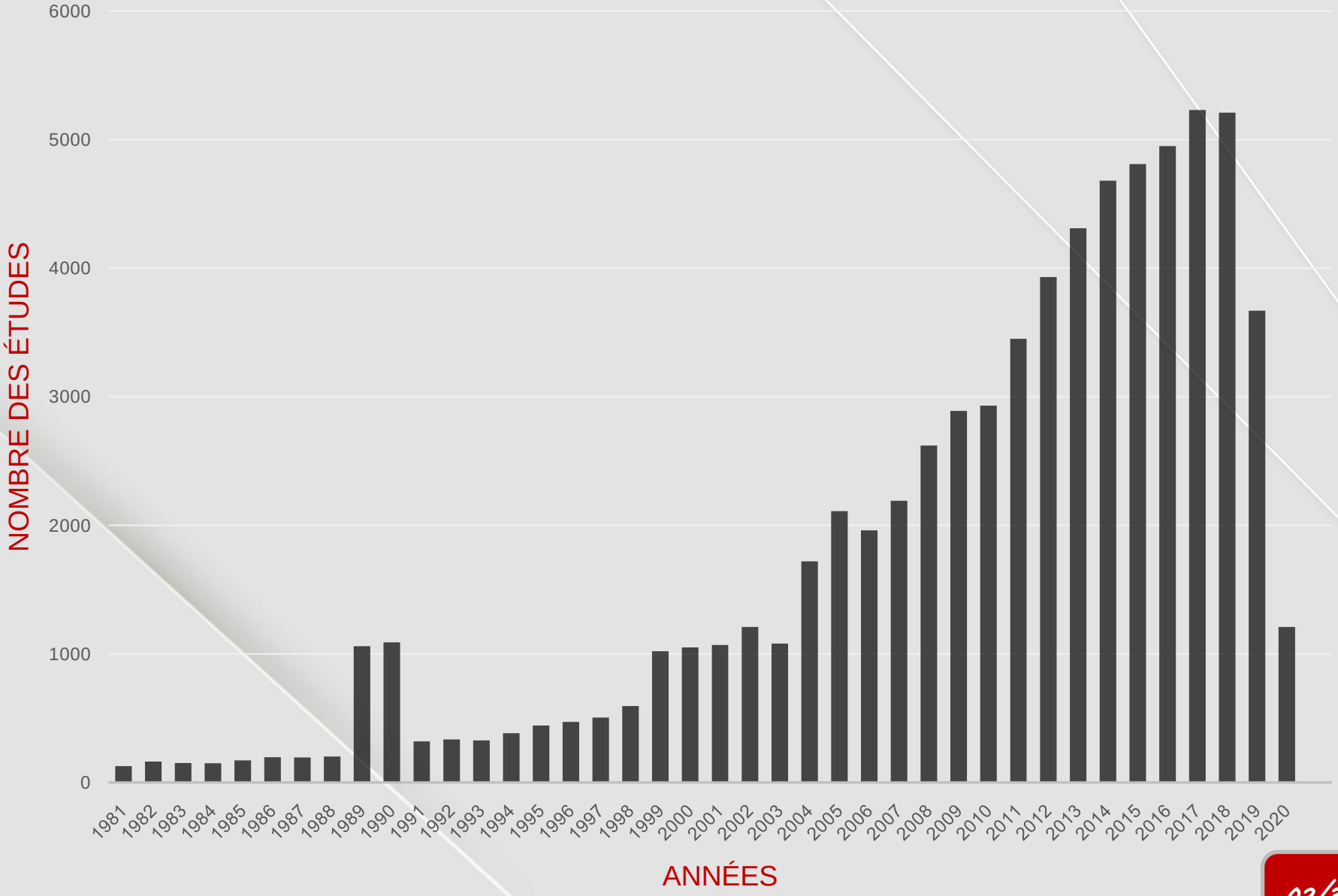
Forte consommation de fruits, légumes, légumineuses et de céréales.

Facteur de protection et prévention

Régime méditerranéen

Facteur de risque

Number of research papers on Opuntia ficus indica



Classification

Plante robuste, grasse [illegible] onstituée de :

Règne :
Plantae

Ordre :
Caryophylla-lles

Fruit

Fleur

Sous-classe :
Caryophyllid-ae

Famille :
Cactaceae

Groupe :
Opuntiaeae

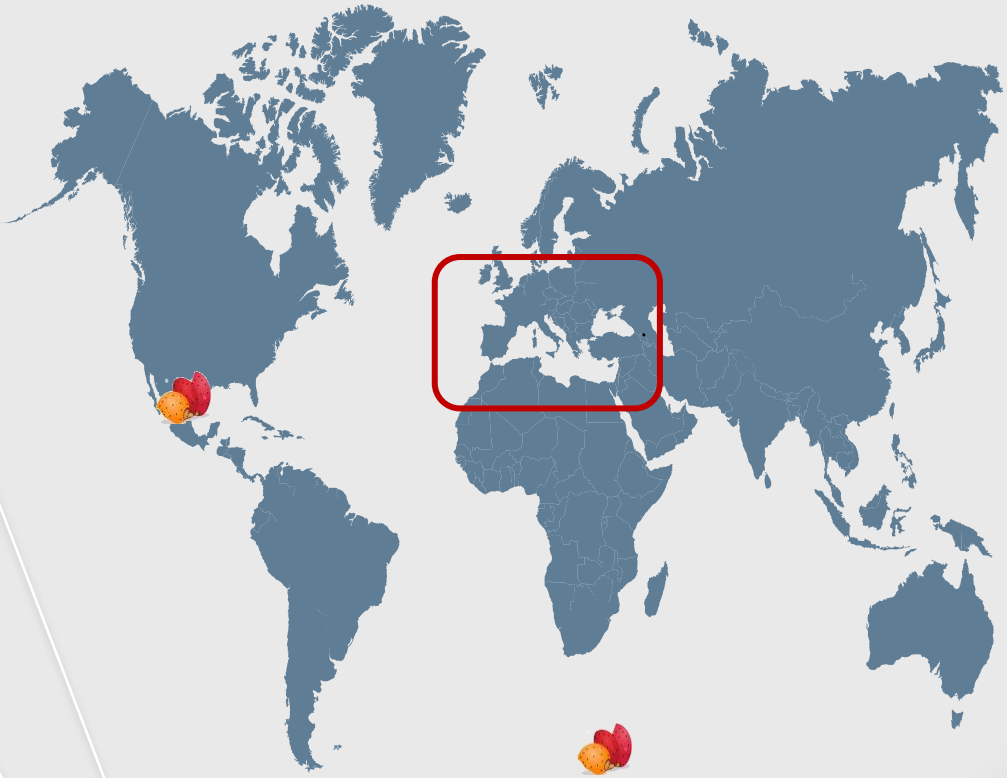
Genre :
Opuntia

Espèces :
Opuntia ficus-indica

ORIGINE AND REPARTITION

Nopal

1- Dans le monde



Le sud de l'Espagne

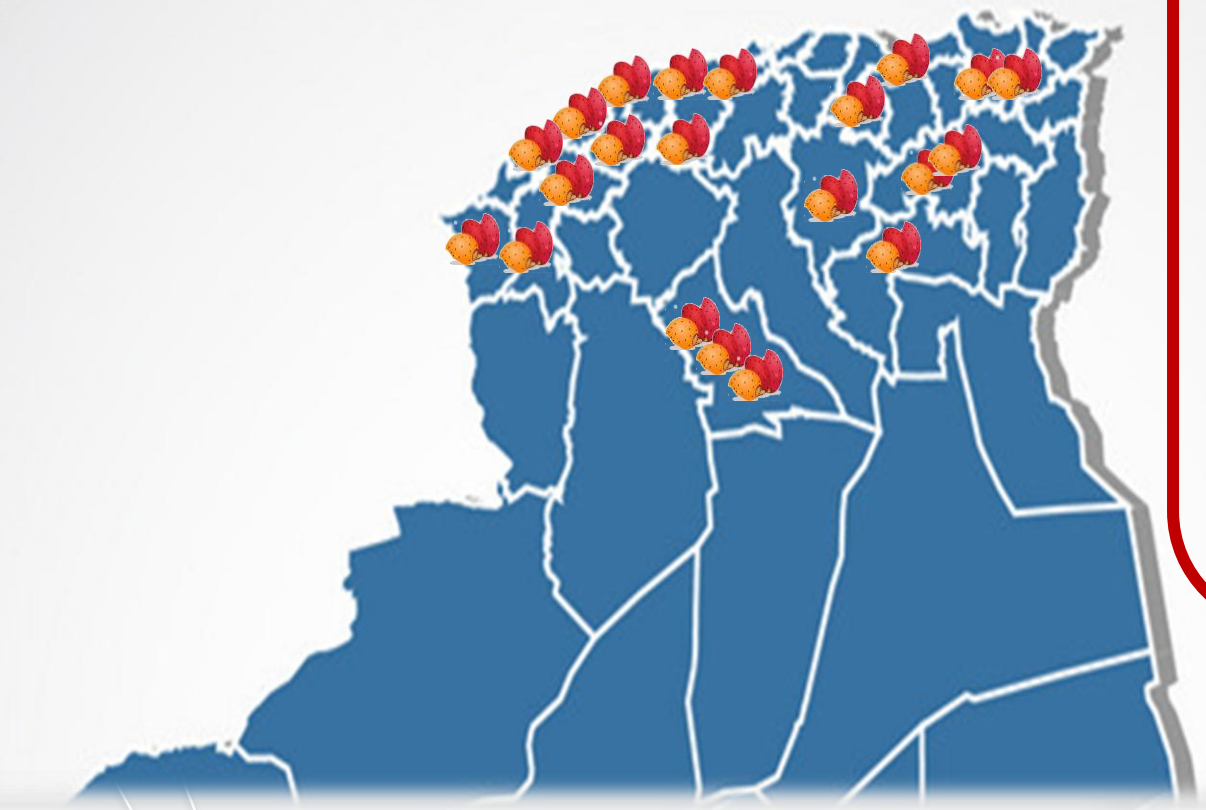
Le Portugal

L'Afrique du nord

Mauvaise herbe

(Bennatia F, 2017)

ORIGINE AND REPARTITION
IN Algeria



- Alger
- M’sila
- Bordj-bou-Arrérij
- Constantine
- Biskra
- Batna
- Laghouat
- Blida
- Boumerdas
- Tipaza
- Tissemsilt
- Chlef
- Relizane
- Mostaganem
- Oran
- Sidi-bel abbes
- Mascara
- Tlemcen

Culture conditions

Conditions écologique

Facteurs biotiques

- Climat
- Température
- sols
- Précipitations
- Techniques de plantation
- Drainage

- Mildou des cactus
- Cératite
- Cochenilles

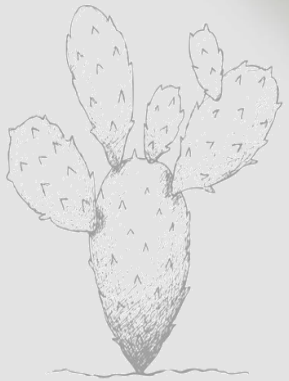
(WalaliLoudyi, 1995)

Opuntia ficus indica Uses

Usage courant	
Industrie alimentaire et agro-alimentaire	• Jus et des confitures. • Colorants alimentaires (le bétalaine).
Usage fourrager	• Complément de fourrage.
Usage agronomique et écologique	• Régénération des sols épuisés.
Production d'alicaments	• Production de gélules comme traitement de certaines maladies.
Industrie cosmétique et pharmaceutique	• Fabrication des shampoings, soins dermiques, thé.

Nutritionnel values

Constiuatnts	Pulpe	Écorce	Graines
Protéines	0.5-5.3	8.30	11.8
Lipides	0.7-1	2.40	6.77
Fibres total	20.50	40.8	54.2
Cendres	0.4-8.5	12.10	5.90
Sucres	11-16	/	/

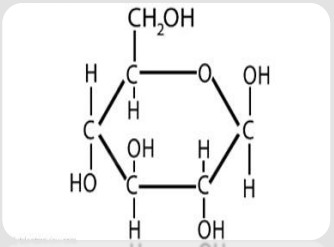


La teneur en eau varie entre 80 et 90% selon la variété de la plante,

(Jiménez-Aguilar et al., 2014).

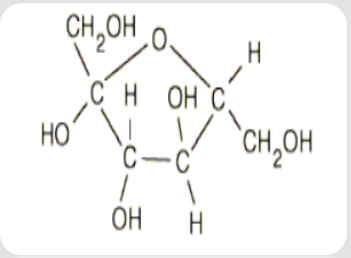
Primary metabolits

Glucides



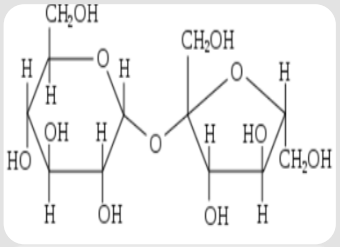
Glucose

29-35



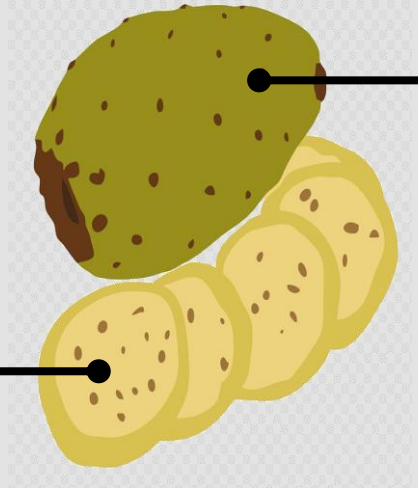
Fructose

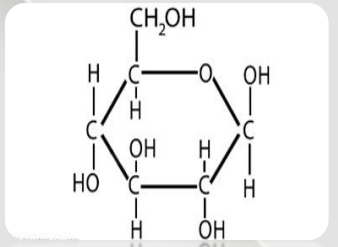
24-29,6



Saccharose

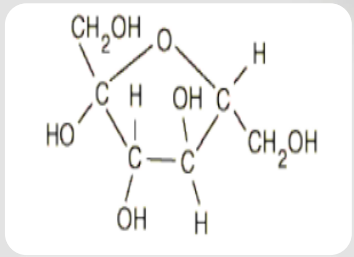
0.19





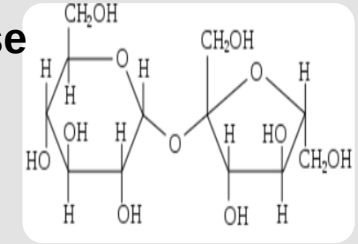
Glucose

14-21



Fructose

2.29 – 2.9



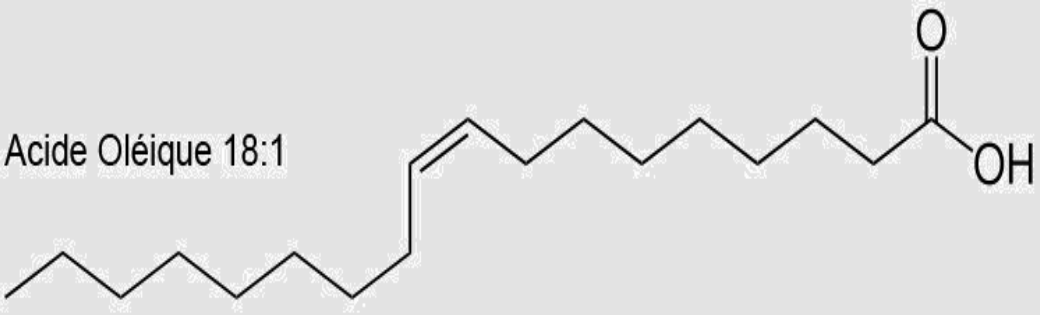
Saccharose

2.25 – 2.3

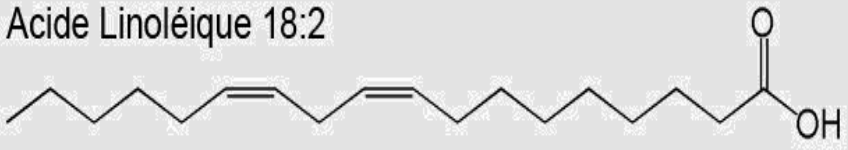
(Nebbache et al., 2009) ; (Jiménez-Aguilar et al., 2014)

Lipides

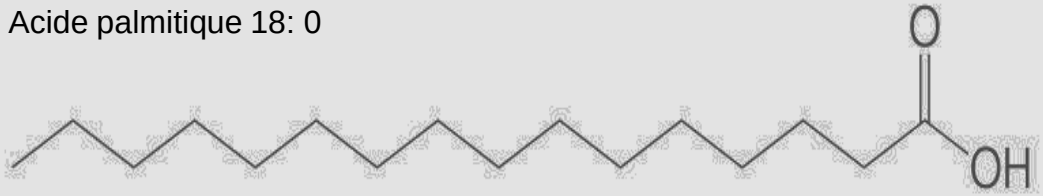
Acide Oléique 18:1

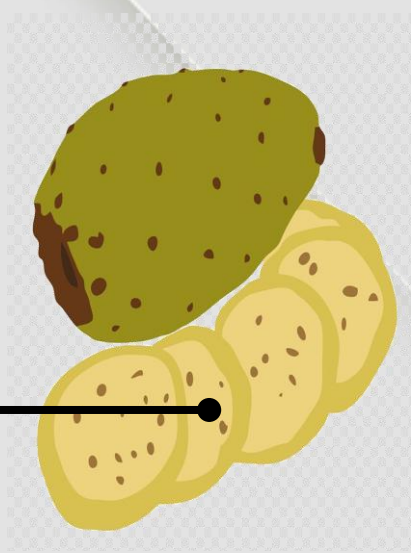


Acide Linoléique 18:2



Acide palmitique 18: 0

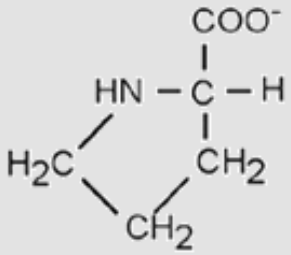




Acides gras insaturés

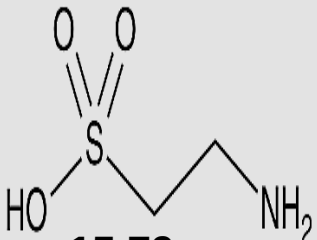
(El-Moustafa et al, 2014)

Proline



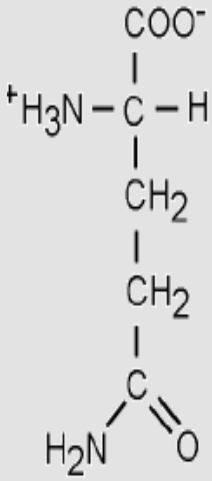
49

Taurine

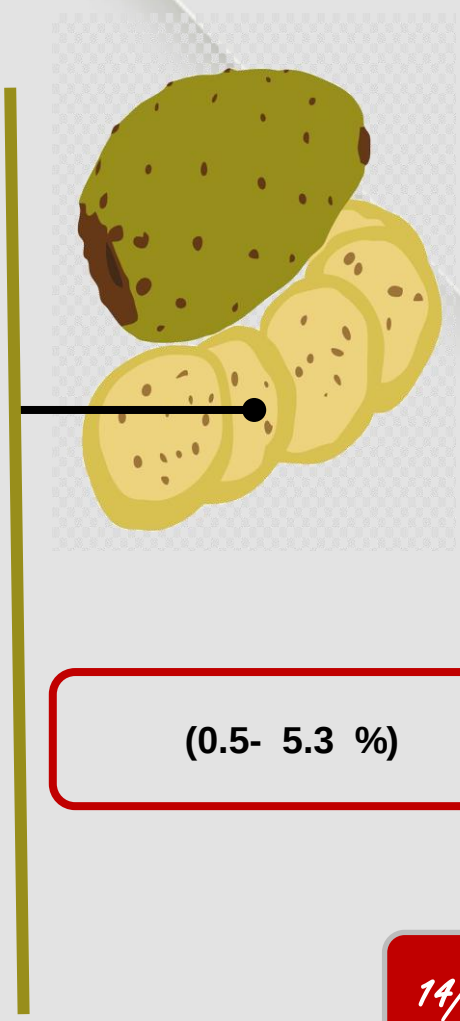


15,79

Glutamine



12,59



(0.5- 5.3 %)

(El-Moustafa et al, 2014)

Fibers and hashes

Cendres

- K • Potassium
- Ca • Calcium
- Ma • Magnésium

(0,28-0,39%)

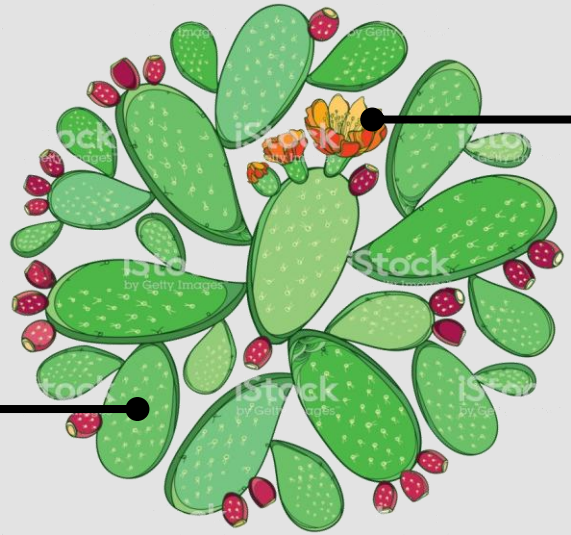
Fibres organiques

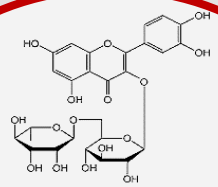
- Cellulose
- Pectine
- Hémicellulose

(0.02-3.15%)

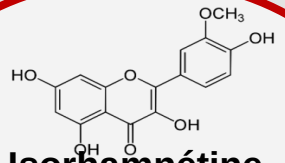
(El-Moustafa et al, 2014)

Secondery metabolits
Phenols

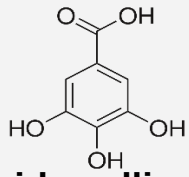




Rutine
2.36-26.17mg/100g
MS

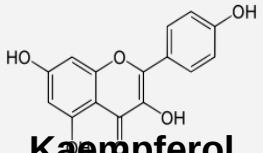


Isorhamnétine
724-4269mg/100g



acide gallique
1630 à 4900mg/100g
MS

Nicotiflorine
146.5mg/100g MS



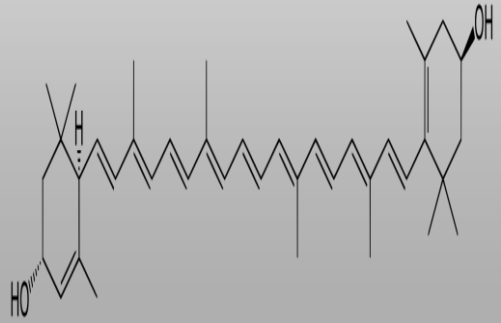
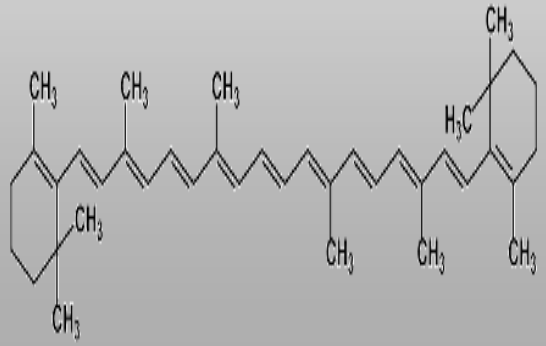
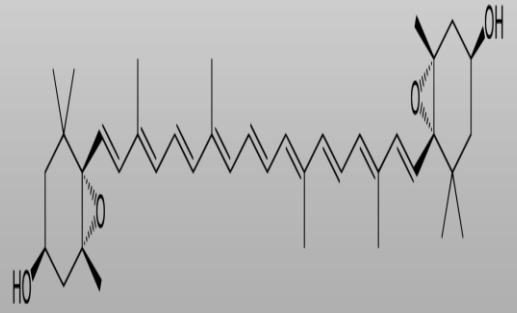
Kaempferol
324-400mg/100g
MS

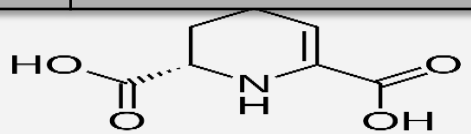
(El- Moustafa et al, 2014).

Bétalaines et caroténoïdes

Bétalaines pigments hydroslubles (jaune et rouge)

Caroténoïdes pigments (jaune-rouge-violacé)

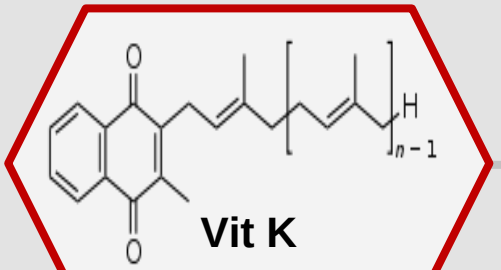
Lutéine (69–72%)	β carotène (12–14%)	Violaxanthine(5%)
		



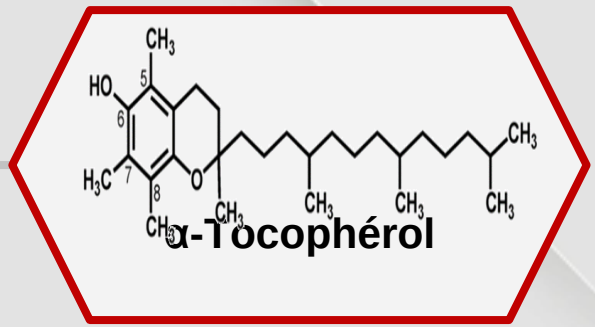
(Barba., et al (2020).

(El- Moustafa et al, 2014)

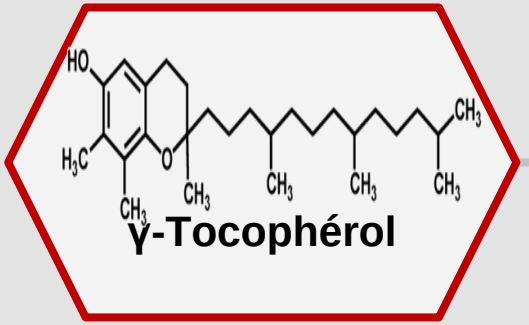
Vitamines



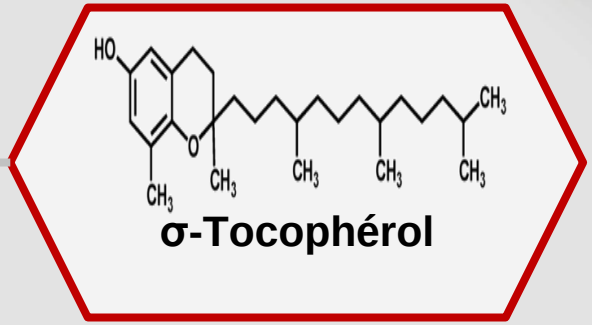
Vit K



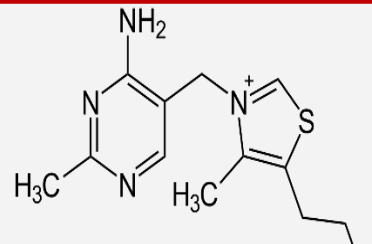
α-Tocophérol



γ-Tocophérol



σ-Tocophérol



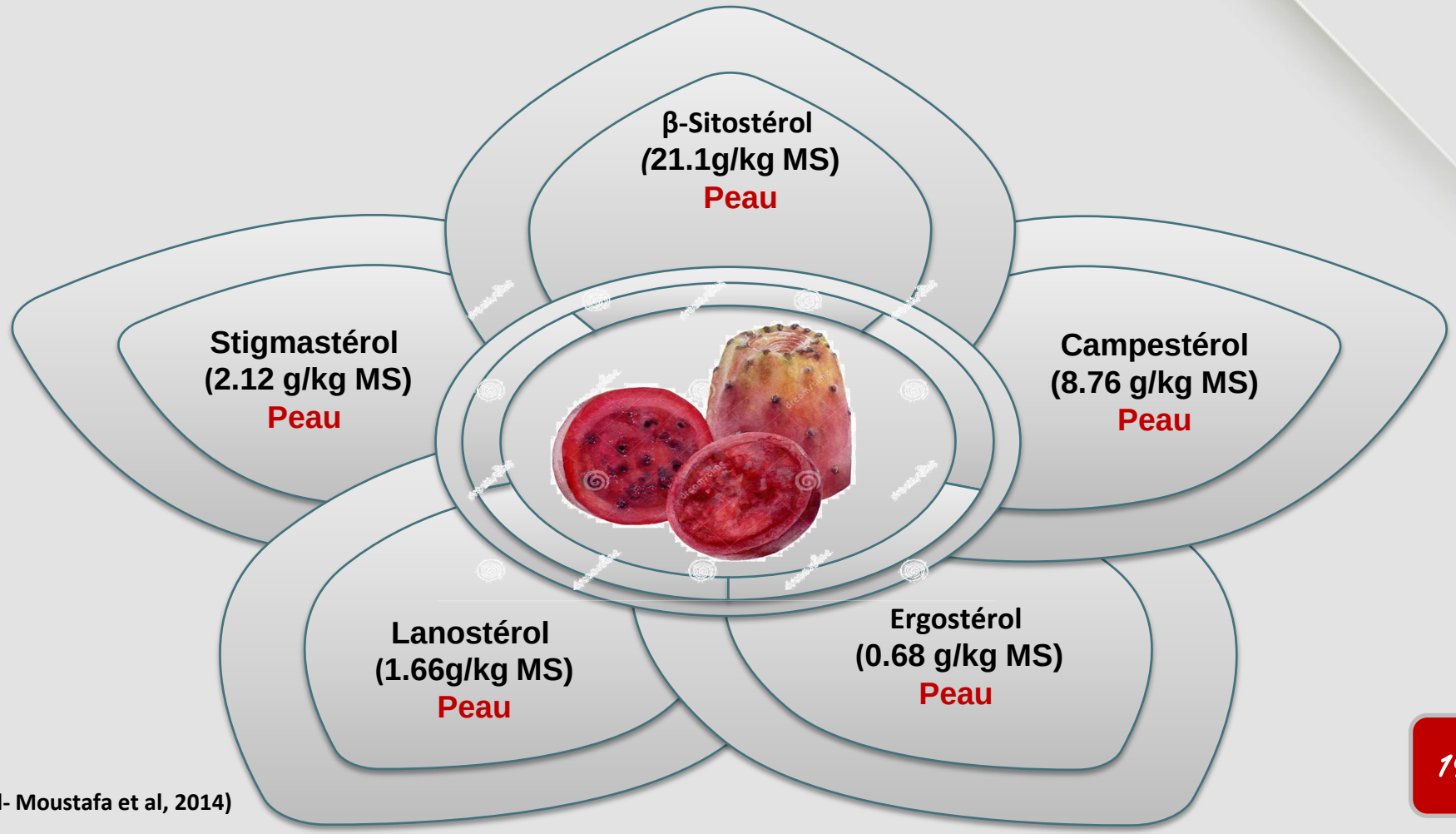
Vit B (0.14-0.60mg/100MS)

(Ramadan et Mörsel, 2003)

(El- Moustafa et al, 2014)

Phytostérols

D’origines végétales, des métabolites secondaires, hypocholestérolémiants



(El- Moustafa et al, 2014)

Composition of Cladeds

Stade de développement

les procédures de manipulation après récolte

Méthodes de cuisson

Type de tissu

Minéreaux

Acides aminés

Fibres

Composés phénoliques

(Hernández-Urbiola et al., 2011); (González-Montero et al., 2009); (Manach et al., 2004); (Jun H et al., 2013).

Activités biologiques d'Opuntia ficus indica

Antioxidant activity

-Bon fonctionnement de l'organisme, prévention de plusieurs maladies
-Mesurée par différentes méthodes : DPPH,ABTS,FRAP,ORAC...
-Due a la sa composition riche en substances bioactives naturelles.

-Activité antioxydante des composés phénoliques, flavonoïdes et bétalaïnes que la vitamine c.
-Activité antioxydante des jus bruts des composés qui les constituent.

(Sharma et al., 2009).

-L'activité antioxydante d'huile est comparable à l'acide ascorbique.

(Wei et al., 2009).

-Présenté une inhibition de l'oxydation de l'acide lionléique.
-Elimination des radicaux libres.
- Composés phénoliques, lui confèrent des propriétés antioxydantes.

(Lee et al, 2002).

Antimicrobial activity

Quercétine

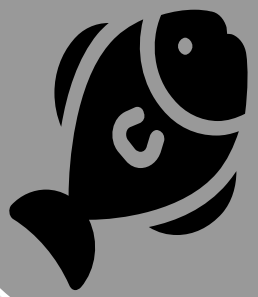
Aeromonas hydrophyla

-Effet inhibiteur sur *Staphylococcus aureus, Escherichia co* et *Enterococcus faecium*

- Effet inhibiteur s

Edwardsiella tarda

L'acide gallique



L'acide cinnamiq

Aeromonas salmonicida

ir antimicrob n sur
bacter jejur
bacter coli, brio
Proteus m bilis,
coccus aur s,
chi nas
ginc

(Castillo et a al., 2012 ; El- Amma

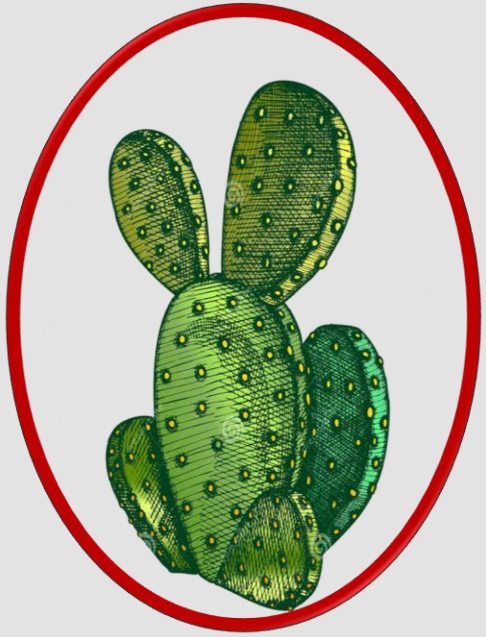
(Prasad et al., 2014 ; Aragona et al., 2017).

Antiulcer and anti-inflammatory activity

Activité antiulcéreuse

Mucilage et pectine

(Galati et al., 2001 ; Kauret al., 2012 ; Trachtenberg et Mayer., 1981; Galati et al., 2002 ; Galati et al., 2003),

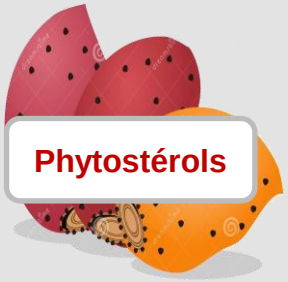


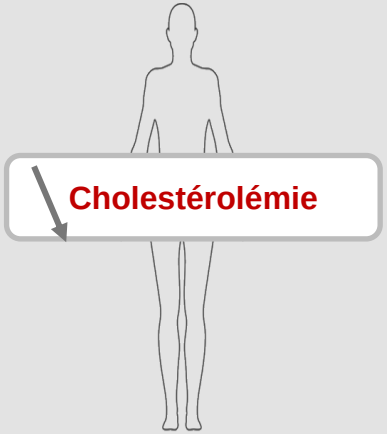
Activité anti-inflammatoire

β-sitostérol

(Galati et al., 2001 ; Kauret al., 2012 ; Trachtenberg et Mayer., 1981).

Diatary proprities





Alimentation riche en huile *d'Opuntia ficus indica*

[Glygogéne] → Glycémie

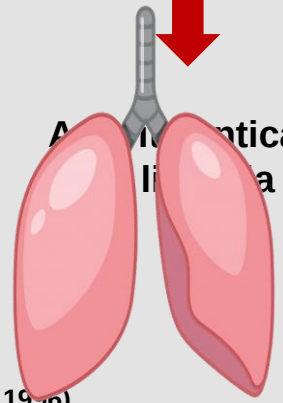
Cholestérol sanguin, LDL, Lipidémie

(Ramadan et al., 2003) (Moghadasian et al., 1999)

Anticancer activity

Extraction des extraits et
des dérivés alcooliques

Bleu de trypan



A[illegible]nticancéreuse
li[illegible]a dose

Extrait de
chloroforme

d[illegible]ol

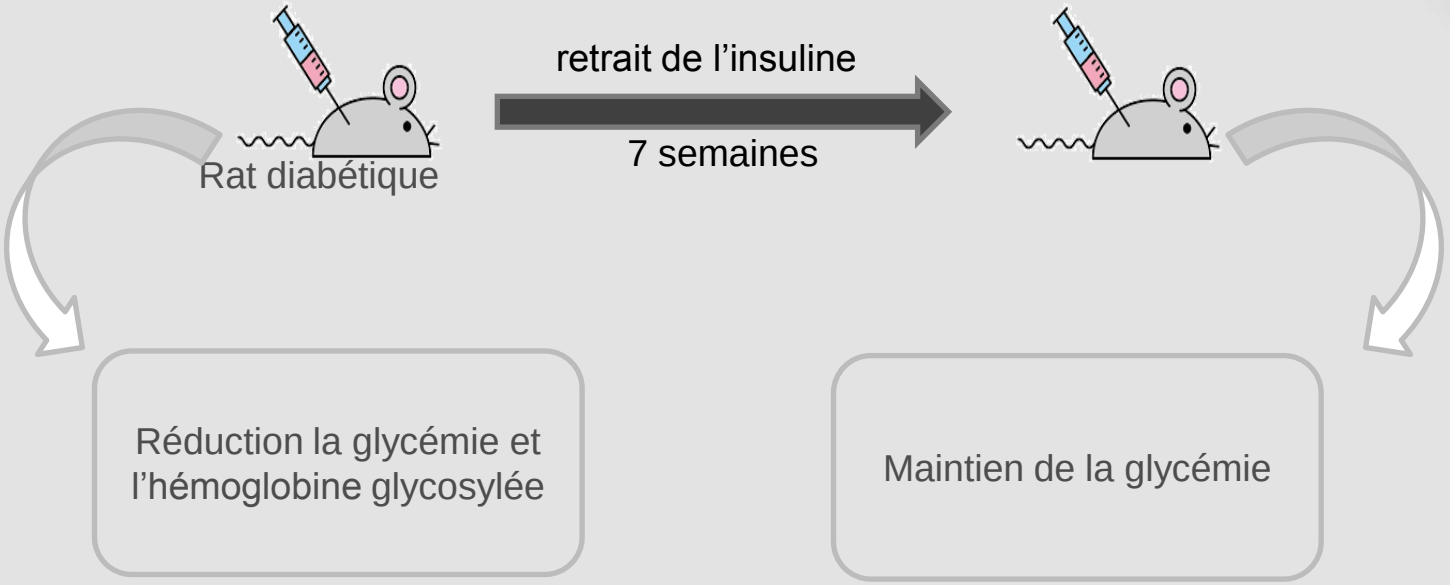
la présence de
pigments de bétanine

(Boutakiout., 2015); (Kapadia et al., 1996).

Antidiabets activity

Traitement combiné d'insuline et d'extrait de cladodes d'Opuntia fuliginosa

Extrait de cladodes d'Opuntia fuliginosa seulement



rats non diabétiques → Ajustement rapide de la Glycémie,

(Augusto et al., 1996).

Conclusions *Opuntia ficus indica is a whispered plant in* Mediterranean region, characterized by its remarquable adaptation to arid, sub-arid and tropical climates. An intensive mini review was conducted on the « *Opuntia ficus indica* » plant commonly known as prickly pear promoting its nutritional value, due to its rich composition in essential nutriments.

The current work intends to highlight the use of the fruit in different fields such as; the medical field including anti-inflammatory, antioxidant, antibacterial, antiulcer, antican cer and antidiabetic activities. It can be used in the culinary field as jam and food coloring; and also employed in the agronomic and ecological field against erosion and as regenerator of exhausted soils; or supplement in fodder use. And in the cosmetic and parapharmaceutical industry which they are integrated in the composition of shampoo and anti-wrinkle skin creams.

Acknowledgments

Authors would like to thank Algerian Ministry of Higher Education and Scientific Research DGEFS, and the Algerian Directorate General for Scientific Research and Technological Development DGRSDT for financial fund.