



International University of Africa
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**Phytochemical Screening, GC/MS Analysis and Biological
Activity (vitro test) of Oil from Heglig (*Balanites aegyptiaca*)**

A Thesis Submitted in Partial Fulfillment of the Requirements
for the M.Sc. Degree in Industrial Chemistry

By

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Dedication

To the fountain of patience and optimism and hope
to each of the following in the presence of God and His Messenger,

my dear mother

To those who have demonstrated to me what is the most beautiful of

my brother's life

To the big heart *my dear father*

To the taste of the most beautiful moments with my friends

I guide this research...

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Abstract

The Heglig (*Balanitesaegyptiaca*) fruits were collected from al-Rahad, North Kordofan, Sudan in 2017.

The aim of this study is to extract oil from seeds, investigate oil content, oil physicochemical properties, oil constituents by GC/MS and biological activity .

Oil content of *Heglig* determined by British pharmacopeia, physicochemical properties determined by British standard and Oil constituents by GC/MS chromatography and biological activity according to the National Committee for Clinical Laboratory Standards Guidelines (NCCLS).

The results showed that the percentage of the oil reaches 38.33%. and it had a fiber 1.29, protein 21.14, fats 19.4, ash 3.253, viscosity 36.76 poise, density 0.9017 g/cm³, Refractive index 1.467, the color degree (yellow 25.26, red 2.00, blue 0.00), Moisture 8.606, acidity number 0.42(mg KOH/g), peroxide value 2.86(mg Eq O₂/kg), Iodine value 98.76(mg I₂/g), Saponification value 189.71g/kg and Un saponifiable matter 1.73 g/kg. The GC-MS analysis showed 25 compounds, the major compounds (more than 10%) are:

9-Octadecanoic acid (Z)-methyl ester (Oleic acid, methyl ester) 29.46%, 9, 12-Octadecadienoic acid (Z, Z)-, methyl ester (linoleic acid-methyl ester) 29.18%, Methyl stearate (stearic acid, methyl ester) 18.71%, Hexadecanoic acid, methyl ester (Palmitic acid, methyl ester) 16.70%. The minor compound (1% - 10%) is Eicosanoic acid, methyl ester (Methyl eicosanoate) 1.81%. The trace elements (less than 1%) are 9-Hexadecenoic acid, methyl ester, (Z) - 0.65%, cis-11-Eicosenoic acid, methyl ester 0.65%,6,9-Octadecadienoic acid methyl 0.52%, Heptadecanoic acid, methyl ester 0.50%, Tetracosanoic acid, methyl ester 0.40%, Docosanoic acid, methyl ester 0.27%, Hexacosanoic acid, methyl ester 0.26%, cis-10-Heptadecenoic acid, methyl ester 0.25%, Methyl tetradecanoate 0.18%, Pentacosanoic acid, methyl ester 0.13%,7-Hexadecenoic acid, methyl

ester, (Z)- 0.08%, cis-10-Nonadecenoic acid, methyl ester 0.07%, Nonadecanoic acid, methyl ester 0.05%, 9,12,15-Octadecatrienoic acid, methyl ester 0.05%, Vitamin E 0.04%, trans-13-Octadecenoic acid, methyl ester 0.02%, Pentadecanoic acid, methyl ester 0.01%, Cis-5-Dodecenoic acid, methyl ester 0.00% , 5-Octadecadienoic acid ,methyl ester 0.00% and 7, 10- hexadecadienoic acid ,methyl ester 0.00% .

The anti Biological activity (Vitro test) showed that the oil anti fungal microorganisms called *Candida Albicans*.

We can conclude that oil content and physicochemical, biological activity and oils constituents were comparatively as the same as the international standards.

Isolated the compound in Heglig seeds oil and study the isolated compounds, make Phytochemical screening to the natural compound in seed oil and more studies are needed for the possible effects of long term consumption of oil.

مستخلص البحث

ثمار شجرة الهجليج (الللوب) جمعت من مدينة الرهد، ولاية شمال كردفان، السودان عام 2017 م . هدفت الدراسة لاستخلاص الزيت من بذور شجرة الهجليج و التحقيق في محتوياته، دراسة الخواص الفيزيائية و كيميائية ، مكونات الزيت باستخدام GC/MS و دراسة النشاط البيولوجي. الخواص الفيزيائية و الكيميائية قدرت وفقا للمعيار البريطاني، محتوى الزيت وفق الفارما كوبيا البريطانية للتقطير المائي، ومكونات الزيت عن طريق GC/MS و النشاط البيولوجي وفقا لطريقة (NCCLS).

النتائج وضحت أن نسبة الاستخلاص من 250 جرام 38.33%، و يحتوي على الألياف 1.29، بروتين 21.14، دهون 19.4، رماد 3.253، اللزوجة 36.76 بواز، الكثافة 0.9017 جم/سم³، الرطوبة 8.606، معامل الانكسار 1.467، درجة اللون (الأصفر 25.26، الأحمر 2.00، الأزرق 0.00)، رقم الحموضة 0.42 ملجم/KOH/جم، رقم البيروكسيد 2.86 ملجم/O₂/كجم، الرقم اليودي 98.76 ملجم I₂/جم، رقم التصبن 189.71 جم/كجم و المواد الغير متصبنة 1.73 جم/كجم .

تم اجراء التحليل بواسطة جهاز GC-MS و وجد أن الزيت يحتوي على 25 مركب ، المركبات الكبرى (أكثر من 10%) هي؛ حمض الأولويك ميثيل استر 29.46% ، حمض الينولويك ميثيل استر 29.18%، حمض الستريك ميثيل استر 18.71%، حمض البالمتيك ميثيل استر 16.70% و الاحماض الصغرى (بين 10 -1)؛ اعطت حمض واحد الايكوسنويك ميثيل استر 1.81% . أما العناصر الآثار (أقل من 1%) فكانت؛ (0.65% - (Z) - Hexadecenoic acid, methyl ester, (9-cis-11-))، (0.65% Eicosenoic acid, methyl ester) ، (6,9-Octadecadienoic acid methyl) (0.52% (Heptadecanoic acid, methyl ester 0.50%)، (Tetracosanoic acid, methyl) (ester 0.40%)، (Docosanoic acid, methyl ester 0.27%)، (Hexacosanoic acid,) (methyl ester 0.26%)، (cis-10-Heptadecenoic acid, methyl ester 0.25%)، (methyl ester 0.18% (tetradecanoate 0.13%)، (Pentacosanoic acid, methyl ester 0.13%)، (7-) (Hexadecenoic acid, methyl ester, (Z)- 0.08% cis-10-Nonadecenoic acid,)، (methyl ester 0.07% (Nonadecanoic acid, methyl ester 0.05%)، (9,12,15-) (methyl ester 0.05% (Octadecatrienoic acid, methyl ester 0.05% trans-13-)، (Vitamin E 0.04%)، (Octadecenoic acid, methyl ester 0.02% Pentadecanoic acid, methyl ester)

5-Octadecadienoic) ،(Cis – 5 - Dodecenoic acid, methyl ester 0.00%) ،(0.01%
(7, 10 - hexadecadienoic acid ,methyl ester 0.00%) و (acid ,methyl ester 0.00%
دراسة مضاد النشاط البيولوجي وضحت أن زيت يحتوي على مضاد لفطر المبيضة البيضاء.

يمكن أن نختم بأن محتويات الزيت ، خواصه الفيزيائية والكيميائية و ناشطة البيولوجي كانت نسبيا
مشابهة للدراسات السابقة.

فصل المركبات الموجودة في زيت بذرة شجرة الهجليج و دراسة المكونات المفصولة ، عمل فحص
كيميائي نباتي للمركبات الطبيعية في الزيت و مزيد من الدراسات لمعرفة الآثار المترتبة على
الاستهلاك المستمر للزيت.

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