

**College of Graduate Studies**

**Sudan University of Science and Technology**

**Isolation and identification of some biologically active compounds  
from some Sudanese medicinal plants**

عزل والتعرف على بعض المركبات الفعالة احيائيا من بعض النباتات الطبية السودانية

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## **DEDICATION**

*This thesis is dedicated to*

*My beloved Parents*

*My great husband and daughters*

*To all my wonderful family and my friends*

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## Abstract

*Chrozophora Plicata* (argassi), *Senna Singueana* (Umm saaba) and *Stylochiton borumensis* (Moura) plants are widely used in traditional medicine to treat bacterial, fungal and viral infections. As a result there was need to investigate extracts of these plants and to provide scientific proof for their wide application in traditional medicine system.

Extraction of leaves and seeds of *C. Plicata*, *S. Singueana* and leaves of *S. borumensis* using solvents of increasing polarity, namely, petroleum ether, chloroform, ethyl acetate and methanol.

For qualitative and quantitative estimation of the secondary metabolites compounds of this plants and found that they contain flavonoids, tannins, alkaloids and glycosides in different concentration of the plants.

The steroid was extracted from chloroform extracts of leaves and seeds of the plants and identified by GC-MS.

The fixed oil was extracted using petroleum ether and identified the fatty acids using gas chromatography mass spectrometer.

Ethyl acetate and methanol extracts for all plants of this study showed high antioxidant scavenging activity using DPPH method.

*S. borumensis* leaves contained high concentration of essential and non essential amino acids, *S. Singueana* and *C. Plicata* leaves contained high concentration ranges of alanine, glutamic and leucine: 754.7-633.7 ppm, 835.9-922.4 ppm, and 731.6-728.6 ppm, respectively.

The percentages of total forms of Pb, Cu and As, in the reference plant material were found to be 5.28%, 0.25% and 1.51% respectively; meanwhile toxic concentrations of heavy metals in the examined plants material were not detected when compared with reference material.

The extracts were tested for anti-fungal and anti-bacterial activities, Using disc diffusion method, by used two gram positive bacteria (*Bacillus subtilis*, *S. aureus*), two gram negative bacteria (*Pseudomonas aeruginosa*, *Escherichia coli*) and two unit-fungal (*C. albicans*, *A. niger*), it was demonstrated that extracts of the leaves and seeds of *C. Plicata* had high anti-bacterial activities against tested organism and low anti-fungal activity against *Candida albicans* but all extracts of leaves and seeds of the plants showed high activity against *A. niger*.

*S. Borumensis* leaves showed that the petroleum ether and chloroform extracts were not active against *Staphylococcus aureus*, *Pseudomonas aeruginosa* but the extracts showed high antifungal activity.

All seeds and leaves extracts of the plants under study displayed moderate toxicity against Brine Shrimps lethality. All extracts of *C. Plicata* leaves and seeds were non toxic against *vero cell* lines suggesting that they were safe. All leaves and seeds extracts of *C. Plicata* were active against *G. lambelia*; chloroform and methanol extracts for leaves and seeds respectively, were the most effective compared to that exhibited by metronidazole drug (89%).

Two new compounds were isolated from methanol extract of the leaves of *Chrozophora plicata*. The new compounds were elucidated by (MS) and (NMR):

1- Kaempferol -3-O-C<sub>1</sub>" glucose

2- Methyl 2-[3-hydroxy-5-(propan-2-yl)phenyl]butanoate

*C. Plicata*, *S. Singueana* and *S. borumensis* revealed variation in various biochemicals analysed; their seeds and leaves could be helpful for pharmaceutical, antimicrobial and antioxidants agents as well as food industries

## الملخص

تستخدم اوراق نبات الارقاسي *Chrozophora Plicata* واوراق ام سآبا *Senna Singueana* واوراق وجزور نبات المورا *Stylochiton borumensis* كنباتات طبية لعلاج بعض الالتهابات البكتيرية والفيروسية الفطرية. تم الاستخلاص باستخدام عدة مذيبات مختلفة القطبية وهي البتروليم ايثر, الكلورفورم , ايثيل استيت واخيرا الميثانول. تم اجراء مسح كيميائي لمركبات الايض الثانوية وجد ان مستخلصات هذه النباتات تحتوي على نسب متفاوتة من الفلافونيدات , التانينات , القلويدات , التربينات والجلوكوسيدات. تم استخلاص بعض الاستيرويدات من مستخلص الكلورفورم وتم التعرف عليها بواسطة جهازكروماتوغرافيا الغازية مع مطياف الكتلة.

تم استخلاص الزيت الثابت باستخدام الايثر البترولي  $(40-60)^\circ\text{C}$  وتمت معالجته لمعرفة الاحماض الدهنية الموجودة فيه بأستخدام جهازكروماتوغرافيا الغازية مع مطياف الكتلة (GC-MS). اعطى مستخلص الميثانول والايثيل استيت اعلى نسبة من مضادات الاكسدة عند المقارنة مع البروبيل جاليت لكل مستخلصات النباتات قيد الدراسة.

تم تقدير الاحماض الامينية في اوراق وبزور النباتات قيد الدراسة حيث اظهرت النتائج ان نبات المورا يحتوي على نسبة عالية من الاحماض الامينية الاساسية والغير اساسية كما تبين ان اوراق وبزوركل من الارقاسي وأم سآبا يحتوي على تراكيز عالية من الاسبارتك والليوسين والجلوتاميك.

754.7-633.7 ppm, 835.9-922.4 ppm, and 731.6-728.6 ppm, respectively.

تم تحديد محتوى العناصر في اوراق وبزور النباتات قيد الدراسة اظهرت النتائج ان النبات تحتوي على العناصر الثقيلة في المدى المسموح به وذلك عند مقارنتها مع عينة نبات قياسية مما يؤكد انها امنة مثل تركيز النحاس, الرصاص والزرنيخ ( 5.28%, 0.25% and 1.51% )

اجريت اختبارات احيائية منها النشاط ضد البكتريا موجبة وسالبة الجرام: *Bacillus subtilis*, *S. aureus*,

*Candida albicans* ونوعان من الفطريات *Pseudomonas aeruginosa*, *Escherichia coli*

*Aspergillus niger*.

اوضحت النتائج ان النشاط ضد البكتريا لمستخلصات اوراق وبذور نبات الارقاسي المختلفة كان متفاوتا للبكتريا موجبة وسالبة الجرام، كما اظهرت النتائج نشاطا عاليا ضد *Candida albicans* اكثر من *Aspergillus niger*. اما نبات ام سآبا ( *S. Singueana* ) فقد اظهرت مستخلصات جزء البذور نشاطا بكتريا عاليا اكثر من مستخلصات الاوراق واعطت مستخلصات البذور فعالية ضد *Candida albicans* اكثر من *Aspergillus niger* اما اوراق نبات المورا (*S. borumensis*) اوضحت ان مستخلص البتروليم ايثر والكلوروفورم ليس لدهما نشاطا بكتريا ضد *S. aureus, Pseudomonas aeruginos* ولكن كل المستخلصات لاوراق المورا اعطت فعالية عالية. اوضحت النتائج ان جميع المستخلصات لاوراق وبذور النباتات قيد الدراسة متوسطة السمية ضد (Brine shrimps) الارتميا. ووضحت النتائج ايضا ان جميع المستخلصات لنبات الارقاسي غير سامة ضد ( Vero cell line ) مما يشير لامكانية استعمالها الامن. اثرت جميع مستخلصات البذور والاوراق لنبات الارقاسي ( *C. Plicata* ) على *G. Lambelia* حيث اظهر مستخلص الكلوروفورم والميثانول فعالية عالية في حين اعطى عقار الميتروندازول 89%.

كما تم عزل مركبين من مستخلص الميثانول لاوراق نبات الارقاسي وهي:

1- Kaempferol -3-O-C<sub>1</sub>" glucose

2- Methyl 2-[3-hydroxy-5-(propan-2-yl)phenyl]butanoate

تم تعريف المركبات بأستخدام جهازمطياف الكتلة (Mass Spectrometer) وجهاز الرنين النووي المغنطيسي (NMR) خلصت هذه الدراسة الى ان نبات المورا والارقاسي وأم سآبا مختلفة في مكوناتها ولكن هذه النباتات تستخدم مصدرا دوائيا او احيائيا اوكمضادات اكسدة وقد تستخدم في الصناعات الغذائية لاحتوائها على نسبة عالية من البروتين والكربوهيدرات.

**CHAPTER ONE**

**INTRODUCTION**

**CHAPTER TWO**

**MATERIALS AND**

**METHODS**

**CHAPTER THREE**

**RESULTS AND**

**DISCUSSION**



**CONCLUSION**

**AND**

**RECOMMENDATIONS**

# **REFERENCES**

# **APPENDIX**