

*Dedication*

To the soul of my Mother, Who dreamed one  
day back to see me as I am today,  
I dedicate to her this humble effort.

## **Acknowledgment**

I would like to express my endless thanks and gratitude to my main supervisor Professor Dr. Abdalbasit Adam Mariod, Faculty of Sciences and Arts-Alkamil, King Abdulaziz University, Saudi Arabia and to my Co-supervisor Professor Dr. Ismail Hassan Hussein, NOPRI, Gezira University; for their helpful supervision, suggestions and guidance and continual supports throughout this study.

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## Abstract

This research was conducted to study the physicochemical characteristics of the seed oil, and the functional properties of proteins, and to examine if any antimicrobial activity is associated with the different *Chrozophora brocchiana* plant parts.

*C. brocchiana*, known in Sudan as Argassi, belongs to the family Euphorbiaceae, and is widely scattered in the poor savanna areas in western Sudan as a range crop.

The oils, extracted from ungerminated and germinated seeds by solvent and cold press methods, were compared and their characteristics, fatty acids composition, tocopherols and oxidative stability were investigated.

Proteins were extracted from defatted ungerminated and germinated seeds using an alkali resolution with isoelectric precipitation and freeze drying. The functional properties of the protein extract concentrates were used in the study. The results demonstrated that *C. brocchiana* seed is a good source of oil (42.9%) and protein (18.2%). Proximate analysis demonstrated an increment in moisture, protein, fiber and ash after germination, while fat and carbohydrate substances were decreased. The fatty acids composition was influenced by germination, where linoleic and oleic acids increased, and palmitic acid was decreased. The concentrations of Na, K, Cu and Mg in germinated seeds were higher than ungerminated seeds. FTIR spectroscopy was used to screen the peak changes during the successive heating at 70°C for 72hrs. and germination was found to decrease the oxidative stability of the oil extracted from germinated *C. brocchiana*.

Phenolic compounds from leaves, stem and oil were extracted using different solvents (methanol, ethyl acetate and hexane) and their antimicrobial activities were assayed using agar well- diffusion method. The methanol, followed by ethyl acetate and hexane, extracts showed considerable amount of inhibition against *Bacillus subtilis*, *Bacillus cereus*, *Escherichia coli*, *Salmonella typhi*,

and *Pseudomonas euroginosa* respectively, with much activity on *Staphylococcus aureus*.

Ungerminated and germinated seed protein concentrate showed a significant difference in crude protein ( $p < 0.05$ ) and moderate water and oil absorption capacities. The protein concentrate showed higher protein content for germinated seed ( $82.2 \pm 0.1$ ) than ( $79.8 \pm 0.3$ ) for ungerminated seed.

## المستخلص

أهداف هذه الدراسة التحقق من بذور نبات العرجسي كمصدر جديد لزيت الطعام والبروتين عن طريق قياس الخصائص الفيزيائية والأحماض الدهنية للزيت، ودراسة البروتين والعوامل المضادة للميكروبات من أجزاء النبات المختلفة.

الزيت الذي تم استخلاصه بالمذيب والاستخلاص البارد من البذور المنبتة وغير المنبتة تمت مقارنة خصائصه ثم التحقق من تكوين الأحماض الدهنية, التوكوفيرول والثباتية للزيت .

أثبتت الدراسة إحتواء بذرة العرجسي علي كمية كبيرة من الزيت (42.9%) والبروتين (18.6%) كما ان البروتين أثبت جدواه حين أضيف إلى دقيق الكسرة .

البذور المنبتة انتجت زيتاً ثقل مقاومته للأكسدة عن الزيت المستخلص من البذور غير المنبتة.

المركبات الفينولية المستخلصة من الأوراق , الساق والزيوت اثبتت امكانية استخدامها كمضادات لأنواع مختلفة من البكتريا والفطريات خصوصا مستخلص الاوراق بمذيب الميثانول.

## **Publications extracted from this Work**

Ahmed M. A, Mariod A.A, Hussein I.H., Kamal- Eldin A.(2014) Review :  
Biochemical composition and medicinal uses of *Chrozophora* genus,  
International Journal of Pharmacy Review & Research, 4(4) 227-232.

Ahmed M. A, Mariod A.A, Mustafa N, Hussein I.H.(2014)  
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Mariod A.A, Ahmed M. A, Hussein I.H., Kamal- Eldin A. (2015) Chemical  
composition, fatty acids and oil stability of *Chrozohpora brocchiana* seed as  
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Figure 4.6 Ph system

Figure 4.7 salt system

Figure 4.8 sugar system

## List of Abbreviations

FFA	Free Fatty Acids
IV	Iodine Value
RI	Refractive Index
PV	Peroxide Value
CHO	Carbohydrates
FAC	Fatty Acids Composition
FTIR	Fourier transform infrared spectra
WAC	Water Absorption Capacity
OAC	Oil Absorption Capacity
FC	Foaming Capacity
FS	Foaming Stability
CSPC	<i>Chrozohpora brocchiana</i> Seed Protein Concentrate .