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Chemical Composition of Essential Oil and Crude Extract Fractions and their Antibacterial Activities of *Capparis spinosa* L. and *Capparis cartilaginea* Decne. from Jordan.

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2012
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A Thesis Submitted in Partial Fulfillment of the Requirements for the Degree of Master of Biotechnology in the Department of Biological Sciences, Yarmouk University, Irbid, Jordan.

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Dedication

This thesis is dedicated to my parents

for their love, endless support

and encouragement.

To my grandparents,

sisters and brothers.

and

To all my friends.
ACKNOWLEDGMENTS

First of all, I thank Almighty God for giving me the courage and the determination, as well as guidance in conducting this research study, despite all difficulties.

I would like to take this great opportunity to express my gratitude and indebtedness towards my esteemed guide Dr. Riyadh Muhaidat for his constant encouragement, continuous support, valuable suggestions and timely advise.

I am extremely thankful to Dr. Mahmoud Al-Qudah for co-advising me during this work and for his great encouragement during the course of this study by providing me with all the facilities that lead to successful completion of my project.

I express my deep sense of respect and gratitude towards Dr. Emad Malkawi and Dr. Hala Al-Jaber for being members of the examining committee.

I would like to express my sincere thanks and heartfelt gratitude to all my graduate batch mates for their help and constant support.

There are no words, which can express my gratitude towards my Parents, sisters, and brothers Mohamad, Abdullah and Moutasem for their unlimited patience, immense care and faith in me.
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List of Abbreviations

ATCC                      American Type Culture Collection
DMSO                      Dimethyl sulfoxide
GC-MS                     Gas Chromatography/Mass Spectrometry
GC-FID                    Gas Chromatography/Flame Ionization Detector
MIC                       Minimum Inhibitory Concentration
Mm                        Millimeter
µg                        Microgram
RI                        Retention Indices
SE                        Standard Error
Abstract

The chemical composition of essential oils and antibacterial activity of crude extract fractions and their phytochemical screening from the Aerial parts of *C. spinosa* L. and *C. cartilaginea* Decne. (Capparaceae) were examined. Hydrodistillation of the fresh flowering aerial parts of *C. cartilaginea* and *C. spinosa* yielded 0.1 % and 0.04 % pale yellowish oils for *C. cartilaginea* and *C. spinosa*, respectively. GC/MS analysis of the essential oils revealed a complex mixture of compounds including nitrogen and sulfur containing compounds, oxygenated sesquiterpenes and monoterpenoid hydrocarbons. Fifty nine components were identified in the oil of the *C. cartilaginea* representing about 95.38 % of the total composition of the oil. The essential oil of *C. cartilaginea* was dominated by methyl isothiocyanate (31.81 %), isopropyl isothiocyanate (18.25 %), isobutyl isothiocyanate (5.40 %), 3-p-menthene (5.18 %), occidol (4.33 %), carissone (3.11 %) and ethyl isothiocyanate (2.55 %). A total of 40 constituents were identified in the oil of the *C. spinosa* amounting to 92.89 % of the total oil content. *C. spinosa* was dominated by isopropyl isothiocyanate (28.92 %), methyl isothiocyanate (25.60 %), butyl isothiocyanate (16.65 %), 3-p-menthene (3.08 %), 2-butenyl isothiocyanate (2.24 %) and 3-methylthio-1-hexanol (2.03 %) as major constituents. The antibacterial activity of Petroleum ether, water, butanol, methanol and hexane crude extracts obtained from the aerial parts of *C. spinosa* and *C. cartilaginea* was examined by agar well diffusion method. Different fractions exhibited good to moderate degrees of activity against most of the bacterial examined. The tested fractions of *C. cartilaginea* were most active against *Streptococcus faecalis*. While, tested fractions of *C. spinosa* were most active
against *Staphylococcus epidermidis* and *Streptococcus faecalis*. The Minimal inhibitory concentrations (MIC) was determined for all active fractions using amended agar method. The butanol fraction of *C. cartilaginea* was most active with MIC of 24 μg/mL. The crude extracts fractions of *C. cartilaginea* and *C. spinosa* were screened for major groups of secondary metabolites through Phytochemical screening. Water fraction of *C. cartilaginea* and *C. spinosa* contained alkaloids, flavonoids and tannins. However, no secondary metabolites were detected in Petroleum ether, butanol, methanol and hexane fractions of *C. cartilaginea*. Alkaloids, tannins were detected in methanolic fraction of *C. spinosa*. While, butanol fraction of *C. spinosa* contained only tannins. No secondary metabolites were detected in Petroleum ether and hexane fractions of *C. spinosa*.

**Keywords:** *Capparis*, Essential oil, Crude extract fractions, Phytochemicals, Minimal inhibitory concentrations (MIC), gas chromatography–mass spectrometry (GC–MS).