Faculty of Science
Botany Department

Morphological and Phytochemical Studies on Some Medicinal Plants in Bani Matar District (Yemen)

A Thesis Submitted for the Degree of Doctor of Philosophy of Science in Botany (Taxonomy of Flowering Plants)

By

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بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

﴿ فَنَبَذْنَاهُ بِالْعَرَاءِ وَهُوَ سَقِيمٌ * وَأَنْبَتْنَا عَلَيْهِ شَجَرَةً مِّن يَقْطِينٍ ﴾

الصافات: ١٤٥-١٤٦

﴿وَالأَرْضَ وَضَعَهَا لِلْأَنَامِ* فِيهَا فَاكِهَةٌ وَالنَّخْلُ ذَاتُ الأَكْمَامِ *وَالْحَبُّ ذُو الْعَصْفِ وَالرَّيْحَانُ﴾

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Declaration

This thesis has not been previously submitted for a degree at this or any other university.

Anhar Abdulkarim Yany

Dedication

This Endeavors Is Dedicated

To My Beloved Father, Mother

And All My Family For Their Love Support And encouraging during all my life, thanks for being here for me.

Anhar Abdulkarim Yany

4/ 9/2018

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All praises are due to **Allah SWT** who had given me blessing, strength, knowledge and save me in finishing this thesis. Salawat and salam also propose to the Prophet **Mohammed SAW.**

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ABSTRACT

Abstract

Morphological and phytochemical studies on some medicinal plants in Bani Matar District - Yemen

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The medicinal plants in Bani Matar District (Sana'a - Yemen) have never been phytochemically or biologically investigated. These plants have great importance due to its extensive use in folk medicine and for the commercial production of essential oils especially the species of the family Lamiaceae. So, this study was carried out on 16 selected medicinal taxa from family Lamiaceae from Bani Matar District. The collected samples were identified and investigated morphologically (whole plant), anatomically(stem, petiole and leaf) by LM., phytochemically and biologically. Also, ethnomedicinal study was carried out to document the knowledge about these plants. Finally, the recorded macro-and micromorphological data with phytochemical essential oils components were analysed using the software ***jmp*** version 13 and resulted in two dendrograms. The evaluation of macro- and micromorphological characters revealed that many characters *viz.* leaf composition, stomatal types and distributions number of stamens, stem vascular cylinder, petiole outline and vasculature types of trichomes, nutlet features, the number of palisade to spongy layers and crystals, are valuable in species identification and delimitation.

Also, the results revealed a relation between types of trichomes and the amount of essential oils produced. Our leaf anatomical results were useful in inferring the interspecific relationships along with the phytochemical results. Documentation to the indigenous knowledge (from the tribal of the study area) were carried out through the ethnobiological approach. It is important for species conservation and sustainable resource use. This study may could be a starting point to the discover more crude drugs of economic importance

especially from that are not documented yet before; (***Lavandula citriodora, Meriandra dianthera*** **and** ***Salvia schimperi*****)**. Also, this study obviously confirmed that, the leaves are the most common part used in traditional treatments.

Fourteen Lamiaceae species were also investigated phytochemically by gas chromatography coupled with mass spectrometer. The antimicrobial activity of oils was assessed using agar-well diffusion method toward representatives for each of Gram- negative & positive bacteria in addition to fungi. One hundred and forty one compounds were identified from the studied taxa. The antimicrobial activity could be attributed to the presence of major components as carvacrol (54%, 52%), α-pinene (56%, 34%, 34%), *Z*-caryophyllene (16%, 10%), caryophyllene oxide (20%) and camphor (64%) and the synergistic effect with other compounds in the oil. The strongest antimicrobial activity against most pathogenic microbial tested was observed in *Lavandula pubescens*, *Thymus serpyllum*, *Teucrium yemense, Stachys yemenensis*, *Otostegia fruticosa, Ocimum basilicum* var. basilicum and *Salvia schimperi*.

The present study indicated that, *Salvia schimperi* can be used as a natural antibiotic (for superficial infections of the skin, oral and vaginal candidiasis caused by ***candida albicans*** also as natural antidiabetic .

So, from this results we can conclude that there are variations in chemical composition between tested plants that affected their antimicrobial activity and so could be used for selection of potential oil which act as a natural antibiotic. More studies on much taxa still needed about this district.

Key words: Antimicrobial activity, Lamiaceae, morphological, phyto-chemical, volatile oil, Yemen.

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