

GC-MS studies of essential oil of *peganum harmala* L. And their antioxidant activity



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LAHORE, PAKISTAN.

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

Then let man look at his food, for that We pour water in abundance; and We split the earth in fragments, and produce therein corn, and grapes and nutritious plants and olives and dates, and enclosed gardens dense, with lefty trees, and fruits and fodder, for us and convenience to you and your cattle.

(Al-Quran)

**Lord Muhammad (peace be upon him)
said,**

*“The Calamity of Knowledge is
forgetfulness; and to lose knowledge is this,
to speak of it to the unworthy.*

*Who are the learned? Those who
practice what they know”.*

DECLARATION

I **Tahreem Saleem** D/O Muhammad Saleem ID: S2016140010, Session 2016-2018 hereby declare that the matter printed in the thesis titled “**GC-MS studies of essential oil of *peganum harmala* and their antioxidant activity**” is my own work and has not been printed, published and submitted as research work, thesis or publication in any form in any University, Research institution etc. in Pakistan or Abroad.

Dated: _____

(Tahreem Saleem)

RESEARCH COMPLETION CERTIFICATE

Certified that the research work contained in this thesis titled, “GC-MS studies of essential oil of *peganum harmala* and their antioxidant activity” has been carried out and completed by **Tahreem Saleem, ID: S2016140010**. The quantum and the quality of the work contained in this thesis is adequate for the award of Degree of MS/M.Phil.

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Dedication

Every challenging work needs self-efforts as well as guidance of elders especially those who were very close to our heart.

My humble effort I dedicate to my sweet and loving

Father & Mother

Whose affection, love, encouragement and prays of day and night make me able to get such success and honour.

Along with to my hard working and respected

Teachers

without their knowledge, wisdom, and guidance, I would not have met the goals. I have to strive and be the best to

reach my dreams

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ABSTRACT

Peganum harmala L. is a perennial plant belongs to family *zygophyllaceae*, usually known as hurmur, harmal or esfand. It is an important medicinal plant because it shows certain therapeutic and pharmacological effects. Chemical composition of *Peganum harmala L.* usually consists of phytochemicals, essential oil and fixed oil. The purpose of this study was to extract the essential oil from the leaves and seeds of *Peganum harmala L.* by hydro-distillation method using Dean-Stark apparatus and to characterize this oil by GC-MS. Total nine constituents of volatile were identified from the seeds and leaves of *Peganum harmala L.* Antioxidant activity was determined by DPPH radical scavenging and antibacterial activity was determined well diffusion method from the essential oil of *Peganum harmala*. Best antioxidant activity was revealed by the essential oil at 100 $\mu\text{g/mL}$ with the percentage inhibition 98.085. Antibacterial activity was determined by essential oil against four bacterial strains but best activity was revealed against *Staphylococcus aureus* and *Escherichia coli* by well diffusion method. This showed the medicinal properties of essential oil *Peganum harmala L.* against bacteria and oxidative species which produced in the body.

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CHAPTER 1

INTRODUCTION



Plants are useful for the mankind. They are essential for the survival of human beings. Because plants produce oxygen which human breathe in and take carbon dioxide which humans expire (Jones, 1996). For example cotton can provide oxygen to 8,000 Kgs per acre and take carbon dioxide 23,404 Kgs per acre exhaled by the humans (Muthu, 2013). Plants are very important because they are used as fragrance like rose oil (Ohloff, 1987), flavoring like rose oil (Ohloff, 1987), insecticide like harmal against *Plutella xylostella* (Abbasipour, 2010) cosmetics like lemon is used in making tooth powder (Kumar, 2013) and rose water as moisturizer (Ohloff, 1987) and medicines like *Allium sativum* in folk medications (Hatfield, 2004) etc.