

## Plant Flora of Iran: History and Applications in Traditional Medicine

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### Introduction

Plants are rich sources of beneficial secondary metabolites which are attractive as flavors, fragrances, pesticides, pharmaceuticals and antimicrobials. The history of using plants as healing agents returns dates back to around 60,000 years ago when the Neanderthals, landed in present-day Iraq, used hollyhock (*Alcea rosea* L.) as a remedy [1]. Plants form an important part of the ecosystem as food and also oxygen-delivery systems. They are unique sources of natural antimicrobials which makes them interesting as alternatives of synthetic antimicrobials [2-5]. It has been estimated that less than 10% of 250,000-500,000 known plant species on our planet have ethno-botanical importance [6]. A wide range of biological activities against fungi, bacteria, viruses and parasites have been described for medicinal plants which are attributed to their biologically active ingredients [7].

### Natural History

Iran with an area of 1,648,195 million km<sup>2</sup> is 18<sup>th</sup> largest country in the world located in three spheres of Asia (West, Central and South) in Middle East. It has about 33% of cultivable land, 14 million km<sup>2</sup> pasture, 60 million km<sup>2</sup> steppes and 16 million km<sup>2</sup> deserts. Because of particular climatic significance owing to possess 11 climates out of 13 world climates, Iran is a rich source of medicinal plants, some of them which employed in traditional medicine for centuries [8].

The first description of use of medicinal plants as remedies in Iran dates back to the Sumerian civilization in 3000 B.C. It believes that the oldest

production in prose of the Neo-Persian literature on pharmacology is the "kitabulabnyat and haqa'iq-uladviyat" or "Book of the Foundations of the true Properties of the Remedies" written about 970 A.D. by the Persian Physician Abu Mansur. During 200-460 BC, the golden age of Herbal-based medicine in Iran was started and then extended by the famous scientists Zakariya-Al-Razi (Rhazes, 865-925), Al-Biruni (973-1048) and Abu Ali Sina (Avicenna, 980-1037). *The Canon of Medicine* written by Avicenna described the ethnobotanical and therapeutic effects of about 800 medicinal plants. It was a standard medical text in Europe and the Islamic world until the 18<sup>th</sup> century and played a crucial rule in European Renaissance.

In a publication written in French in 1974 by Professor J.L. Schlimmer, of the Polytechnic College of Teheran entitled "Terminologie Médico-Pharmaceutique et Anthropologique Francaise-Persane", a full list of medicinal plants of Iran was published. In 1890, Dr. J.E.T. Aitchison has botanically explored portions of Iran and the neighboring regions in "Notes on the Products of Western Afghanistan and of North-Eastern Persia" published in Edinburgh. During 1929-1958, five collections of medicinal plants of Iran were published under the names of "Useful plants and drugs of Iran and Iraq" by David Hooper, 1937 and *Flore de l'Iran* and Medicinal plants and drugs of plant origin in Iran; parts I-IV" by Ahmad Pasha, founder and leader of the Museum of Natural History of Teheran during 1946-1958. These collections comprised about 200,000 herbarium specimens from different parts of Iran [9].

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### Purification of Active Principals

Silica gel column chromatography is the first step for purification of plant bioactive metabolites [4]. A glass column (50 × 2.5 cm) equilibrated with *n*-hexane is packed with the Silica gel (75-150 μm particle size). One gram of plant materials (essential oils or extracts) loaded on top of the gel is eluted stepwise with *n*-hexane (500 ml), *n*-hexane/ethyl acetate (in 3 steps of 95:5, 90:10 and 80:20, v/v, each of 500 ml) and ethyl acetate (500 ml), successively. The flow rate is considered at 5 ml/min and 5 fractions will be collected in amounts of 500 ml each. All fractions are condensed by rotary evaporator near to dryness and they will check for antimicrobial properties by microbioassay technique [4, 10]. The active fraction is further purified by HPLC (column: reverse C<sub>18</sub>, 10 mm × 250 mm, 5 μm; an isocratic elution of 60% acetonitrile in water; flow rate: 3ml/min; detection: 254 nm) to obtain bioactive principal. In some cases, a complementary high-performance thin layer chromatography is necessary for gain final purification. Identification of bioactive metabolite needs infrared (IR), nucleic magnetic resonance (NMR) and mass spectrometry (MS) analyses.

### Concluding Remarks

World trade of medicinal plants is now more than 50 billion dollars. According to the latest published data, Iran's contribution of this market is about 60 million dollars which increases every year [11]. With rapid growing of the medicinal plants industry, it has been predicted that the trade of medicinal plants reach to 5 trillion dollars in 2050. Since only 130 species of about 7500 native plant species growing in Iran are known for their anti-infective use in traditional medicine, this trade will be very promising and cost benefit in future with a brilliant landscape.

Journal of Medicinal Plants and By-products is an international journal devoted to the study of the medicinal plants and their by-products. The journal covers a diverse, interdisciplinary range of topics that is unique in breadth and depth. Different formats include original articles, review articles, research notes, and short communications are welcome for publication which highlights important developments in the fields of medicinal plants from epidemiology to chemistry and molecular biology.

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