



A Review on the Medicinal and Aromatic Plants Growing in Libya and Their Therapeutic Properties.

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Abstract

Plants are a rich source of diverse metabolites that have been traditionally used for thousands of years all over the world, providing safer and inexpensive therapeutic option for millions of people in developing countries including Libya. Many types of medicinal plants growing in Libya possess significantly important curative activities and have been traditionally used for treatment of chronic diseases such as diabetes and cancer, as well as their biological activities such as antibacterial, antifungal, anti-parasitic and insecticidal properties, etc. Apart from the therapeutic activities, most of Libyan nation rather to use natural and plant-based materials for their daily activities such as food preservation, food flavoring as well as medicinal usages. This review presents the most important medicinal plants growing in Libya with their traditional usage, medical properties, and compare the reliability of using these plants as therapeutic agents. Presenting the latest works that have been done in term of justification of the traditional use and scientifically proving its ability as therapeutic agent

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1. Introduction

Numerous medicinal plants have long been traditionally utilized as therapeutic agents [1]. Various specialized metabolites have been isolated, which proved their medical activity such as anti-diabetic activity [2], antioxidant [3], anticancer activity [4], antibacterial activity [5], antifungal activity [6], anti-parasitic activity [7], anti-inflammatory activity [8], wound healing [9, 10] and hypolipidaemic effects [11], etc. These metabolites are believed to be used by the plants as defence strategies to adapt and survive in different ecological situation and against different parasites [12].

The demand of safer and cheaper plant-based medicine, pharmaceuticals, food supplements, health products, cosmetics and nutraceuticals, are increasing and gaining more interest among the scientists worldwide [14]. In the current century, natural or plants-based products represent up to 50% of all drugs in hospitals and clinical use [15]. More than 50% of the approved medicinal based drugs during the last 3 decades are directly or indirectly either from natural resources, including plants, animal and/or microorganisms [16].

Numerous wild plants in North Africa have a high potential value of medicinal and biotechnology use, more than 70 000 different plant species worldwide have been considered as medicinal plants or at least involved in folk ethno therapy [17, 18]. However, medicinal and aromatic plants growing in Libya were first briefly mentioned in a the united nations

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educational, scientific and cultural organization report [19]. Mukassabi et al. [17] reviewed the morphological description, the medicinal values and active substance materials make-up of 93 wild poisonous plant species in Libya.

Despite the frequent and traditional use of these plants, there are a huge gaps of knowledge about the actual medicinal values of these plants in the region including their productivity, autecology, distribution and their possibility of cultivation [20]. Since, the establishment of the new national strategy in Libya, open and closed wild conservation areas, using the media to increase the public awareness of the importance and value of different wild plant species, which could conserve the vegetation and protect the country from the critical climate conditions [21, 22]. Not much have been recently done regarding presenting different types, properties and medicinal values of Libyan medicinal plants compared with their traditional use. Here, we aim to deliver summery on the commonest, high medicinal value of the plants growing all over Libya.

2. Material and Methods

The current research was conducted using several popular search engines including Science Direct, PubMed, Web of Science, and Scopus. It mainly focused on English and Arabic written research and review papers published in the past 20 years.

3. Results and Discussion

The results of our current investigation revealed to numerous plants with highly curative capacity for the treatment of major and minor human disease [23]. The finding revealed that most of nations preferred to use plants based therapeutics mainly to cure their wounds, and as antidiabetic. It has been reported by World Health Organization that the majority of population especially in developing countries including Libya chiefly depends on the traditional medicines and herbal drugs for treatment of primary health care requirements [24]. However, significant number of plants based drugs have been developed and introduced to the market, which gave a remarkable contribution to current therapeutics [25]. According to many sources such as [17, 26, 27] the prevalence of usage was mainly among the elder peoples especially in the villages and rural regions, compared to the cities and the capital. Many medicinal plants growing in Libya have been found to carry many active compounds that have significant role in management of variety of human mild and chronic diseases such as microbial infections, inflammations, cancer, diabetes and so on [28, 29]. Figure 1 presents some of these widely growing plants and trees in different regions in Libya.

Three main local botanical habitats are present in Libya, for instance, the coastal and the desert habitats

with their crossing valleys from south to north as well as from west to east, giving the chance for more than 1800 different plant species to grow, which are flourishing in these habitats [30]. Libyan people have been found to use medicinal plants and their based materials as medicinal supplements as many of them possess antiseptic, insecticidal and parasiticidal activities, which consider as nontoxic material and cost effective [31]. The presence of the active compounds polyphenol in many Libyan plants such as phenol and flavonoids, which contained high free radical scavenging molecule that are rich in antioxidant activities and thus have anticancer properties [32]. Table 1 presents the most abundant medicinal plants growing in Libya with their common Arabic name, traditional use, the main active compounds and the scientific medicinal and biological properties.

4. Traditional use of Libyan Medicinal Plants from Scientific Aspect

The development of medicinal plants or plant-based drugs started when development of chemistry, isolation, purification, characterization of plant active compounds. Many medicinal plants have been reported to have the ability to inhibit the production and expression of the pro-inflammatory mediators cytokines and TNF- α , other plants have the ability to enhance the production of IFN- γ [50]. Rahbardar et al. [51] investigated the anti-inflammatory effect of the widely growing in Libya medicinal plant *Rosmarinus officinalis L.* The authors reported that the laboratory rats exhibited a marked expression in the levels of inflammatory markers compared with the controls, on both days 7 and 14. The plant extract was able to significantly decrease the amounts of many inflammatory markers. Diabetes has become a major health problem in recent years worldwide, especially in the Middle East region; it is one of the five leading causes of death in the world [52]. The prevalence of this chronic disease in Libya attracted the attention of WHO, as it become a major health issue in the past 10 years. Traditionally, people in Libya use numerous of medicinal plants as an anti-diabetic agents. El Adib et al. [53] in vitro evaluated the inhibitory effect of leaf, seed, and pulp extracts of *Argania spinosa L.* against the enzyme α -amylase related to diabetes. The authors reported strong activity of the plant to inhibit α -amylase enzyme.

Edrah et al. [26] screened the phytochemical presents in *Ephedra altissima* from Libya, which is known in Libyan by local traditional name Khadraia and it is traditionally used to treat asthma, bronchitis issues as well as cold and flu. The authors extracted many active compounds that can significantly use to treat such diseases. *Artemisia campestris L* is another anti-diabetic medicinal plant commonly used in Libya and North Africa.

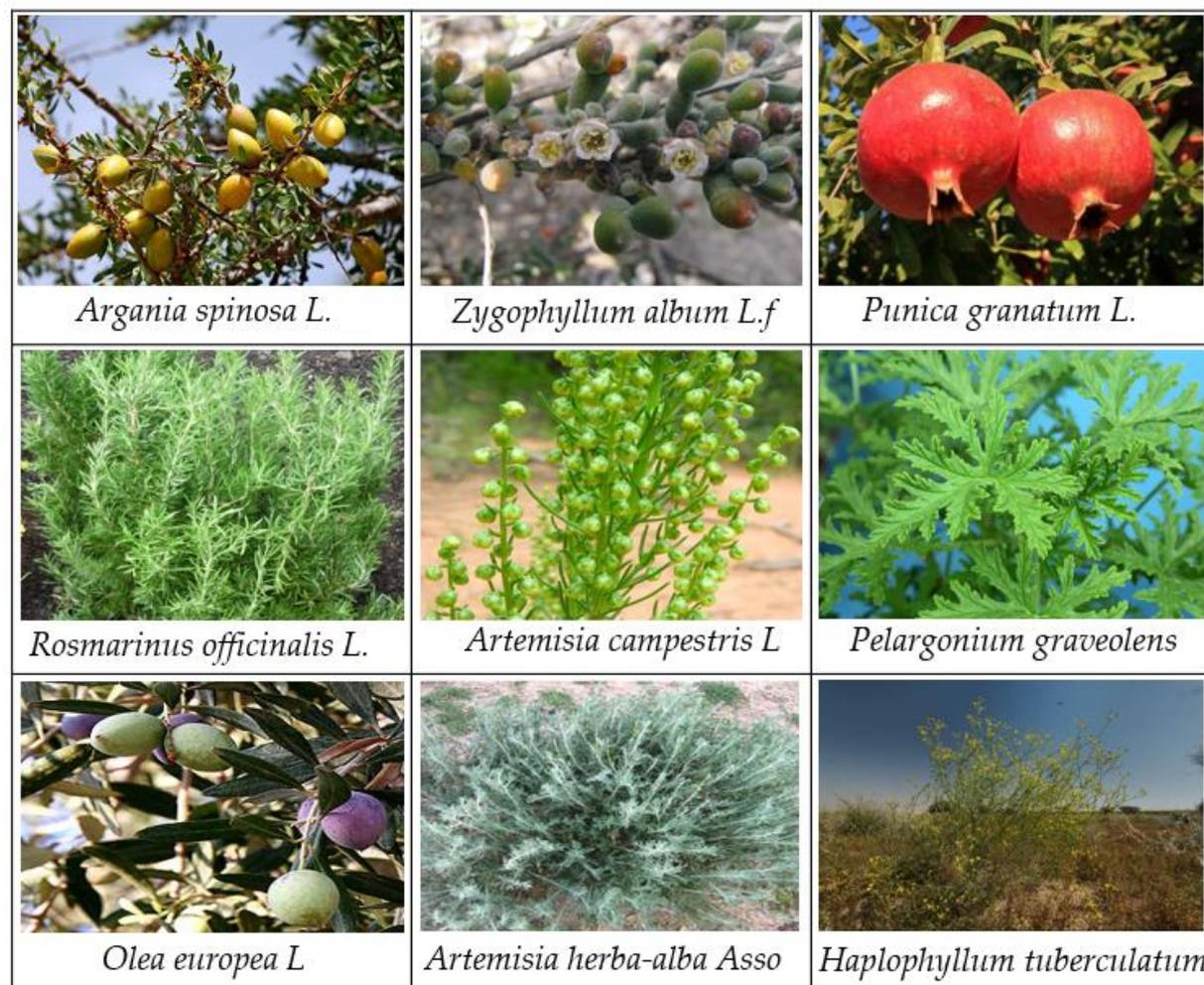


Figure 1. Medicinal and Aromatic Plants growing in Libya and North Africa

Table 1. Medicinal plants growing in Libya with their traditional use

Scientific Name of Plant	Common And Arabic Names	Traditional Use	Phytochemicals	Medicinal And Biological Properties	Ref
<i>Anethum graveolens</i> L.	Dill الشبث	digestive disturbances, insomnia and urinary infections	Alkaloids, resin, steroid, terpenoids, flavonosides, saponin, flavonoid, and tannin.	Insecticidal, antimicrobial, anti-inflammatory, anticancer and antidiabetic activities	[33, 34]
<i>Pelargonium graveolens</i> L'Her	rose geranium العطر	Various kinds of inflammatory diseases	Flavonoids, tannins, geraniums, phenolic acids and proanthocyanidins	Treatment of diarrhea, diabetes, gall bladder, inflammation, liver, and gastric ulcer	[35]
<i>Acacia saligna</i> (Labill.)	Blue-Leaf Wattle سنط الإكليل الذهبي	Cracks of feet and hands, Abscess and Constipation	Polyphenols, 5-glucoside, rutoside, coumaric and gallic acids, hyperoside, 3-glucuronide, apigetrin and apigenin	Strong antioxidant activities, in addition to antibacterial, antifungal and anticancer activities	[36] [28]

<i>Punica granatum L.</i>	Pomegranate الرمان	Anti-tapeworms, diarrhea, dysentery and hemorrhages.	Flavonoids; anthocyanins anthoxanthins, ellagic acid, tannins; phenolic acids and ellagitannins.	Strong antioxidant, antibacterial, antifungal, anticancer, liver problems & allergies	[37, 38]
<i>Anastatica hierochuntica L.</i>	Rose of Jericho كف مريم	Labour pain, menstrual cramps and uterine haemorrhage	New skeletal flavonoids, lariciresinol, evofolin B, balanophonin, rutin kaempferol, and luteolin	Antioxidant and antimicrobial activities, Hypoglycemic and hypolipidaemic effects	[39, 40]
<i>Viburnum tinus L.</i>	Laurustinus لوراسئينوس	Gastritis and anti-inflammatory	Iridoids, coumarins, saponins, and flavonoids	Neuroprotective and antioxidant activity, diuretic, antispasmodic and sedative properties	[41, 42]
<i>Olea europea L</i>	Olive الزيتون	Heart disease, anti-diabetic and anti-cancer	Polyphenols, tyrosol, hydroxytyrosol, Quercetin, oleuropein, rutin, and apigenin	Antioxidant, anti-diabetic, cardioprotective and anti-inflammatory	[43, 44]
<i>Trigonella foenum-graecum L.</i>	Fenugreek الحلبة	Anti-diabetic and digestive disturbances	Alkaloids, saponins, steroids, tannins, flavonoids, amino acids and trigonilline.	Anti-inflammatory, cholesterol lowering agent, anti-diabetic, liver disorder and as an anti-fertility agent.	[45]
<i>Scabiosa arenaria Forssk.</i>	Scabiosa arenaria Forssk.	Anti-diabetic and respiratory problems	Phenolic compounds, triterpene saponins, and ursolic acid.	Antidiabetic, bronchial pneumonia, bronchitis, influenza and asthma	[46]
<i>Rosmarinus officinalis L.</i>	Rosemary اكليل الجبل	To treat otitis, auricular, liver, dermatoses, cough cold, and asthma	Flavones, flavonols, flavanones, 5 phenolic acids, diterpenoids, 1 triterpenoid and 3 lignans	Antioxidant, anti-cancer, anti-inflammatory and antimicrobial	[47]
<i>Artemisia herba-alba Asso</i>	Desert Wormwood الشايح	Anti-tapeworms, diarrhea, and digestive disturbances	Flavonoids phenolics, volatile and essential oils.	Antinociceptive, antiviral, antidiabetic, anticancer, antibacterial and antioxidant	[48]
<i>Haplophyllum tuberculatum</i>	Meseika صنان التيس	Arthritis, skin discoloration and antiparasites	Alkaloids: haplophytin A &B, flindersine, oleanolic, kusunokinin, β -sitosterol, cholesterol and hexadecanoic acids	Anti-cancer, uterus-relaxing, antioxidant antibacterial activities	[49]

The administration of the aqueous extract of from *Artemisia campestris L* to alloxan-induced diabetic rats at a dose of 200 mg/kg resulted in a significant reduction in glycemia [54]. *Zygophyllum album L.f* have been used to reduce blood sugar in many parts in

the Mediterranean see especially in Tunisia, Libya, Algeria and Morocco. It is also used for other purposes such as an antioxydant and antilipedimic [55]. Accordingly to traditional medicine, many research has proven that the ethanolic extract of this plant was

significantly able to reduce plasma glucose level in streptozocin diabetic mice when it consumed for 14 days [55]. One recent study was conducted on the administration to the essential oil of *Zygophyllum album L.f* for 30 days, the diabetic rates after alloxan treatment, showed an excellent effect in the management of diabetes, the essential oil was able to inhibit many digestive enzymes such as α -amylase [56].

Punica granatum L. traditionally used in Libya to treat digestive issues as well as antibacterial and anti-inflammatory agent, its commonly used in north Africa as well as Turkey and Iran. Lansky et al. [57] investigated the potential use of *Punica granatum L.* extract for treatment of cancer and inflammations. The authors concluded that the phytochemistry and pharmacological actions of the compounds present in all *Punica granatum* suggest a wide range of medicinal use and clinical applications, for treatment of chronic inflammations and for the treatment and prevention of cancer. *Trigonella foenum-graecum L.* is a famous medicinal plant in Libya for its potential in treatment of type II diabetes. Many people have use it and still using this medicinal plant as a herbal tea to reduce their blood sugar. Lu et al. [58] investigated this potential by conducting a study on sixty-nine type II diabetic patients whose blood glucose levels were not well controlled. The authors revealed that there were statistically remarkable decreases in the HbA1c in the treated group as compared to those in the control group, concluding a great potential for this plant to lower the blood glucose level and ameliorate clinical symptoms in the treatment of type II diabetes.

Pelargonium graveolens L'Her is an aromatic plant used in Libya as flavoring agent in tea and for wound treatment as antibacterial material. Bouzenna et al. [59] and Pradeepa et al. [60] confirmed the antifungal and antibacterial activity of *Pelargonium graveolens* respectively. The two studies revealed that the plant extract was able to kill the microorganisms (fungicidal and bactericidal activities). Medicinal plants have been used since thousands of years and still in use until today, many current works have proven their activity as therapeutic agents.

5. Conclusions

Herbal medicine based on different aromatic and medicinal plants is effective, lesser side effect, and affordable than the medicines bought from an allopathic medicine. It has been used since ancient for different mild and severe health issues. As developing country, Libyan nation seemed to be dependent on the medicinal plants, as a safer and cost effective option. They have been used different medicinal plants as antibacterial, wound treatment agents, antidiabetic, and even anticancer materials. The activity of different used types of Libyan medicinal plants have been

scientifically proved, as they possess many secondary metabolites. It has been well documented that medicinal plants and their derivatives play critical roles in modern drug development. Medicinal plants growing in Libya have the potential to be an important natural resources in developing of new drugs.

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