

## Iranian Medicinal Plants: From Economically to Ethnomedicine Studies

Ali Salehi Sardoei\* 

Horticulture Department, Faculty of Plant Production, Gorgan University of Agricultural Sciences and Natural Resources, Gorgan, Iran

\*Corresponding Author E-mail: [Alisalehisardoei1987@gmail.com](mailto:Alisalehisardoei1987@gmail.com)

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### ABSTRACT

**Introduction:** Iran is a privileged country with a high rank in plant biodiversity, including 11 of the 13 globally known climates. According to botanists and researchers, there are about 8000 medicinal plants species, which is at least twice the European continent's species diversity. Studies have shown that over 2300 plant species in the country have medicinal and aromatic properties and could be as spices and cosmetics. The high diversity of medicinal plants in Iran has made traders aim to export these products. The tariff code (HS Code) for medicinal plants in world customs is 121190. Iran was evaluated as the number one leading country in terms of medicinal plants export in 1998 and the fifth in 2003, and it came to 32 in rankings due to some problems. In 2018, the share of Iran from medicinal plants trade was 440 million dollars, while the total global transaction of medicinal plant import was about 124 billion dollars. This outstanding amount of trade creates unique opportunities for the traders of these products. The highest export of Iran currently belongs to saffron; damask rose, licorice cumin, and cilantro, with 80-90% of the exports was in bulk and only 10% as essential oils and extracts. The first destinations for medicinal plants export are Pakistan and UAE, followed by Germany, Japan, and China.

**Keywords:** Biological activities; Coriander; Damask rose; Exports; Licorice; Scientific studies; Saffron.

### 1. Introduction

According to Euromonitor (2017), medicinal plants are an emerging industry in the agricultural sector with an average annual growth of 15.5%, whose current global trade is more than 150 billion dollars, and it is expected to

reach over 450 billion dollars by 2025 and more than 5,000 billion dollars by 2050. Unfortunately, our country owns a small share of this global trade producing over 70% of Damask Rose (Table 1) and about 90% of the world's saffron [1].

**Table 1.** Area under cultivation of Saffron, Damask Rose and other Medicinal Plants

Row	Plant	Area under cultivation (hectares)	
		2013	2020
1	Saffron	82000	120000
2	Damask rose	13700	27000
3	Other medicinal plants	48000	81000

A review of the current situation of medicinal plants in the country shows that we have not yet achieved the primary role of medicinal plants in the economy despite paying particular attention to the issue of medicinal plants and trying to develop cultivation and processing and placing medicinal plants as well as their products in people's food basket. The table above shows the area's development under cultivation of medicinal plants in the country in recent years [2].

According to the Deputy Minister of Horticulture of the Ministry of Jihad Agriculture report, the dollar value of exports of these items has increased from \$ 200 million in 2013 to about \$ 400 million in 2019. Thus, although there has been a growing trend in the cultivation and export of medicinal plants, there is a considerable distance between this growth and the prominent place of medicinal plants and their potential role in the economy [3].

There are two important approaches to resolve this situation and create an economic transformation [1] as follows:

1. Achieving improved and exclusive cultivars of Iranian medicinal plants and their extensive cultivation, the production of seeds and seedlings of these cultivars are necessary to achieve this goal. These plants and their products have a competitive advantage in global markets and can increase Iran's share of world trade, providing essential processed, branded and marketed products. Fortunately, the extensive research of the Forests and Rangelands Research Institute in identifying the

phytochemical capacity of medicinal and aromatic plants in the country and cultivating and domesticating the prior and valuable plants has provided this opportunity, so that it is on the agenda of the Medicinal Plants Research Department to produce seeds from 50 cultivars out of more than 30 species of medicinal plants [3].

2. It has no high added value to standardize the conversion industries and production process to complete the posterior link loops of the medicinal plant's chain, develop the cultivation of medicinal plants without performing processing operations, and produce different products. Calculations show that \$ 950 million worth of plant raw materials produced in the country will come to \$ 1.7 billion added value if the initial processing stages including drying, washing, sorting, disinfection and initial packaging are carried out. This added value will reach \$ 5.3 billion with the secondary processing and production of raw materials required by industries such as essential oils, extracts and other products used in the pharmaceutical, cosmetic, and food industries.

The current problem of many industries in the country is that this secondary processing is not standardized. For example, damask rose essential oil produced in the country is not of high quality because it is produced through making rosewater and contains only the remaining unresolved compounds in rose water, and costs a low price in global markets. Many herbal distillates produced in the country contain minimal effective ingredients.

The technology of producing other products, such as Concrete and Absolute from damask rose, does not exist in domestic industries. There is also no proper and standard industry for extracting essential oils in the country [2].

To standardize the production process of some relatively common products of medicinal plants in the country, it is possible to create semi-industrial pilots to produce standard products and determine their quality and export marketing and encourage domestic industries to improve their industrial systems and produce quality and value-added products [4].

In this context, it was of great interest for us to collect scientific reports/studies, deriving from traditional practices, regarding health properties: biological activities of native Iranian plants proper to the medicinal and nutraceutical use, to provide a complete overview of the scientific knowledge and establish a starting point for further research. Particular attention was paid to works that open up research possibilities on new therapeutic assets that deserve a follow-up to determine the efficacy of the reported biological activities in vivo.

### **1.1. Saffron medicinal and aromatic plant**

Undoubtedly, saffron (*Crocus sativus*) is Iran's most important medicinal plant and spice. This plant is the most expensive agricultural and medicinal product in the world and a unique and significant product because of its low water requirement compared to other agricultural products, rural occupation and preventing their migration, high medicinal and spice value, easy storage and transportation, and especially its high income compared to other products [1].

135 tons of saffron was exported from Iran to more than 50 countries. In 2014

which imported a foreign exchange value of over \$ 300 million. In 2016 Khorasan Razavi province merely exported more than 142 tons worth over 204 million dollars. According to Mohsen Ehtesham, Chairman of the National Saffron Council of Iran, due to the annual increasing area under cultivation for saffron, its cultivation area is expected to exceed 100,000 hectares in the country this year, which requires more efforts to exceed 300 tons of saffron exports [2]. Now, what should be done to develop this strategic product in the country, increase the income of its producers, increase the entry of saffron into global markets and increase the country's share of international trade in this product?

The first issue is that Iran's share of saffron exports is small compared to its role. Although Iran is the largest producer of saffron in the world, because most of its products are exported in bulk without proper packaging, it does not get proper added value; However, Spain, which does not produce even one ton of saffron, exported about one hundred tons of this product in 2014. The UAE, which does not even have a saffron farm, is one of the major exporters in the world [4]. Just because saffron is bought in bulk from Iran, packaged, and exported with higher added value. Isn't it time to give substantive thought to the packaging industry in the country?

The second point is that saffron can be cultivated and developed in many parts, and the world also has a higher consumption capacity. The development of saffron cultivation requires not to hinder the transfer of its onion to other country provinces except Khorasan. Suitable accessions for each climate region are also introduced with a serious and in-depth study on the diversity of saffron accessions in the country. Finally, efforts are made to develop global markets and branding [4].

The third point is to prevent saffron onions from being sent to other countries. Although fortunately, the quality of saffron in Iran is still high due to unique climatic conditions and many countries that try to produce it are not able to compete with our country. Still, if we do not have a clear strategy for this issue, we will soon have serious competitors [5]. It should be noted that Afghanistan did not produce even one kilo of saffron in 1991, but now it is thinking of producing about 14 tons. The country has no tariff barriers to exporting its saffron to the United States, India and China, and uses cheaper labor force. New competitors are now active in saffron production and trade, including Afghanistan, Greece, Morocco, Turkey and India. China has also started to produce this product by greenhouse methods. So a solution should be found before it is too late.

Fortunately, saffron has trade unions such as the National Council and the Exporters' Union in the country. Although farmers do not seem to have a serious role in these organizations, but supporting these organizations, which are good centers for expressing problems and providing solutions to get out of them, can be helpful to the comprehensive development of this strategic product. It is well possible to determine fair prices to protect the rights of hardworking farmers, defend the rights of consumers in domestic and foreign markets, package it properly and brand it, organize and manage the saffron market and take care of this ancient heritage and prevent saffron onions from exporting by these organizations and by government's serious support [1].

## **1.2. Damask rose medicinal and aromatic plant**

After saffron, the most important medicinal plant in Iran is the damask

rose (*Rosa damascena*). Iran along with Turkey and Bulgaria, is one of the largest producers of damask rose in the world. What gives particular importance to the damask rose is an extensive area under cultivation of damask rose in the country (about 18,000 hectares in 2016), long history of traditional rose extraction, production of rose distillate and essential oils at the industrial level and most importantly the medicinal and aromatic properties of damask rose, extensive consumption of rose distillate and its other products among the people of Iran and other countries, especially neighboring countries. Currently, the livelihood of many Iranians in different parts of the country, especially in the provinces of Fars and Isfahan, is from the cultivation and processing of damask rose. Also, the possibility of developing its cultivation, especially dry farming in areas with rainfall between 300 and 700 mm per year, has provided a good capacity for job creation, the creation of small and large conversion industries and wealth generation [1].

In 2016, more than 85% of the area under cultivation of Damask rose was in Fars, Kerman, Isfahan and East Azarbaijan provinces. The plan of the Deputy Minister of Horticulture in the Ministry of Jihad for Agriculture is to increase 25,000 hectares of area under cultivation of Damask rose for dry farming and 23,000 hectares for irrigated farming during the five years of the Sixth Development Plan [2].

Now, the main point is that what should be done to develop the cultivation of this strategic product in the country and to increase the income of its producers and to increase the entry of this valuable plant into global markets as well as to grow the country's share of damask rose business? First of all, it is worth mentioning that the most important and expensive products that can be prepared from damask rose are

essential oil, concrete and absolute, and rose distillate is of the next importance. Factories and industrial equipment in Turkey and Bulgaria work to produce these products. In Iran, first rose distillate and then essential oil (of lower quality than competing countries) is produced. There is no concrete production and absolute on an industrial scale [2].

The first and most important measure to develop damask rose cultivation in the country, increase added value, develop exports and increase the country's share of global trade in this product is to increase the number of essential oil and damask rose factories along the damask rose cultivation areas in the country. The creation of small, but many industrial units prevents the transportation of damask rose over long distances which cause a severe drop in the quantity and quality of its essential oil.

The second point is to use the right equipment for extracting essential oils. The essential oil extracted from rose flowers is not of the desired quality due to the dissolution of some aromatic and essential compounds in rose distillate, so it is purchased at a much lower price. In other words, rose distillate and essential oil should be produced separately.

The third point is to design and manufacture or even purchase the equipment needed from abroad to extract concrete and absolute from Damask rose. The export of dried rose buds and petals, which have many fans in some countries such as Japan, should be considered seriously. The way these products are dried and packaged also plays a significant role in their marketing. Large amount of rose distillate in the market, its sensitivity to heat, cold, light and microbial contamination, problems of transportation and storage of rose distillate in high volumes, the possibility of fraud in the production of rose distillate in large quantities and also the

use of plastic containers to store rose distillate are among the challenges of the flower growing industry and rose picking in Iran. If the tendency of this industry to produce other products from damask rose such as essential oil, concrete and absolute changes, these problems will automatically [3].

### 1.3. Licorice medicinal and aromatic plant

After saffron and damask rose, the third most important and valuable medicinal plant in Iran is licorice (*Glycyrrhiza glabra*) [4]. The plant is commercially grown in Central Asia, China, Afghanistan, Iran, Turkey, Syria and Italy and is widely exported. In Iran, it grows in the provinces of Fars, Kermanshah, Hamedan, Lorestan, East and West Azerbaijan, Isfahan, Ardabil, Kerman, North Khorasan and Razavi.

Underground stems and roots of this plant with different compositions are in use with different compositions. The most essential ingredient that makes it sweet is a compound in the plant called glyceric acid, which is fifty times sweeter than sugar. Its amount is between 5 to 20% depending on the environmental conditions and plant species [6].

Glyceric acid and glycerin are helpful in treating gastrointestinal ulcers. The roots of this plant also contain coumarin, flavonoids, essential oils and plant sterols. In traditional medicine, this plant treats muscle spasms and swelling, bronchitis, rheumatism, and arthritis. Licorice has many other medicinal properties that cannot be described here.

This plant is mainly grown in wheat fields in our country that are harvested by farmers in the form of weeds and wild flower and are provided to factories producing powder and licorice extract. In 1965 the first factory for licorice powder and extract production was established in Iran. Before that, licorice root was exported raw from the country

(although licorice root was exported for many years afterwards. In fact, the export of raw root was banned from the beginning of 1992). There are currently 14 factories in the country with an annual production capacity of 18,350 tons of licorice powder and extract, which is a good capacity.

About 95% of the licorice powder and extract produced is exported, which is a high comparative advantage. Although powders and extracts are intermediate products of licorice and a wide variety of final products can be produced from this plant that do not yet have a place in Iranian industry, but doing the same processing step also creates higher added value than raw root exports. Unfortunately, the excessive harvesting of nature and the drought of recent years have reduced the growth of licorice root as the raw material of these factories so that the actual production of the existing factories is about one third of the nominal capacity. Meanwhile, other factories have been permitted to establish. Hossein Kamali, secretary of Iran's licorice Export Production Union, explains the situation of the total export of licorice's extract between 2005 and 2014 as follows: In the last 4 years, the average export was 6,600 tons, but it has faced a decline in exports every year and in 2014 it reached 5,900 tons. The financial value of these transactions also decreased from \$ 44 million in 2011 to \$ 33 million in 2014 [2]. According to him there has been a decreasing trend in this field since 2011, and this trend does not seem to progress this year either. Kamali considers the establishment of 14 companies in this field disproportionate to the existing raw materials in the country and says that a number of companies have resorted to importing licorice root as necessary and have tried to cover part of the capacities in order to export afterwards. Relying on nature without thinking and investing in licorice

cultivation has caused this problem; a problem that will undoubtedly occur sooner or later for all plants that are harvested only from nature.

Of course, the import of licorice root can create added value for the production of powders and extracts in the country, but a more basic solution is the cultivation and production of licorice. It should be noted that if the Iranian export market is lost, competitors will not easily allow us to return. Therefore, the cultivation and processing of licorice should be planned. Efforts should also be made to produce various final products and export them in order to generate high added value to the country. In the country the use of licorice extract as a sweetener in medicines, especially herbal medicines, use in traditional medicine and culture for its consumption in food products as a sweetener can be useful. Licorice is now used in some medicinal products such as Altadine tablets, antidiabetics, De Reglis, Liquofar, Massument, Mentazine, Razin, Aromatic Regis and Shirinosh. Deficiency and declining trend of licorice root (raw material) harvest in the country are serious problems for existing industries. Tariff-free imports of the plant's roots from neighboring countries can help alleviate this problem to some extent. Cultivation of licorice by the Ministry of Jihad Agriculture and the allocation of seeds and other inputs for its cultivation and rehabilitation should also be considered [4]. Researchers should also give researchers more attention to the necessary research for the cultivation and processing of licorice. Researchers should also give researchers more attention to the necessary research for the cultivation and processing of licorice.

#### **1.4. Cumin medicinal and aromatic plant**

Cumin (*Cuminum cyminum*) is one of the products that Iran has a large share

of its global production and exports, and between 20 to 40 percent of global production of this product belongs to this country. The part used in this plant is its fruits, which contain many essential oils. Green cumin is a major component of curry and chili powders and is used as a flavoring in various food-commercial products. The essential oil of this plant is used through steam distillation to flavor drinks, desserts and condiments and is also an aromatic component of creams, lotions and perfumes [7].

The area under cultivation and production of this product in Iran is significantly enormously grown in recent years. Its cultivation range has been extended from major producing provinces to other regions and over 18,000 hectares. Khorasan province owning more than 12,000 hectares of cumin cultivation (about one third of which is dry farming), is the main area producing of this product in the country and its production in Khorasan has a significant share in creating employment and added value. Product marketing actions are done in traditional domestic markets. Since a large share of the production of this product is done for export, so little processing is done on it. Cumin exports have been accompanied by fluctuations in different years, which have caused severe fluctuations in product prices [1].

Some restrictions and issues have led to a lack of stability and continuous growth of cumin exports. This product has been exported to many countries. Still, in recent years, the United Arab Emirates, Pakistan, Japan, Germany, and the Netherlands have been major buyers of Iranian cumin. The United Arab Emirates and Pakistan are the main customers. Given the favorable climatic conditions and the relatively long history of Iran's presence in the field of exports, there is a good prospect for a broader presence in export markets. Export

development of this product and benefiting from its appropriate added value require strategy and planning. India is the world's largest producer of green cumin, but consumes about 90% of its production domestically [3]. After India, Iran, Turkey and Syria are other significant cumin producers in the world. It is noteworthy that cumin produced in Iran is a good product in terms of quantity and quality of active ingredients [8].

Easy planting, growing and harvesting cumin, low water requirement and the possibility of dry farming, resistance to pests and diseases, suitable economic justification, relatively short growing season, and adaptation of growing season to the rainy season in arid and semi-arid regions of the country are unique features of cumin which allows the development of its cultivation in these areas. Unfortunately, a significant share of Iranian cumin is exported to the United Arab Emirates in raw and bulk packages of 25, 50 and 80 kg and it is sent to international markets in the name of the UAE after processing. Many factors have caused losses to domestic producers, such as lack of proper processing and conversion and packaging industries for many medicinal plants, including cumin. Creating these industries following global needs and standards will make it easier to enter higher value-added global markets [9].

The use of high-yielding and high-quality cumin cultivars, development of cultivation in arid and semi-arid regions, development of conversion and complementary industries, efforts to produce and export cumin products including essential oils and observance of internationally accepted standards in production and packaging can be effective in expanding its export. Considering the severe competitors in the production and export of cumin these

points should be paid more attention to maintain and develop global markets [7].

### 1.5. Coriander medicinal and aromatic plant

Coriander (*Coriandrum sativum*) is one of the edible and medicinal plants located in Iran (about 7,000 hectares) after cumin in cultivated area. Native to southwest Asia and west to North Africa, the plant is widely used in the Middle East, the Mediterranean, India, South Asia, Latin America, China and Africa. Existence of foreign markets and export of most of the coriander produced in the country is a comparative advantage for this medicinal plant [5].

Coriander is widely used in food preparation and creating a pleasant taste and rather than, it also has a high nutritional value. Coriander fruit is one of the most important sources of essential oils in the pharmaceutical and cosmetic industries. Coriander seeds also have many effects such as antimicrobial, analgesic and carminative effects, anti-spasm, stomach tonic, better digestion, appetizing, sinusitis pain relief, earache, sore eye and toothache. It was used for headache, chest pain, cough, and asthma. Fresh coriander leaves are one of the most popular vegetables. There are aromatic substances in the composition of the leaves and seeds of this plant with appetizing properties used in preparing various meat dishes and dairy such as hamburgers, steaks, pizzas, yogurt and baking some breads and sweets [8].

Coriander contains vitamins 6B, C, A, iron, magnesium, calcium, potassium and fiber. Coriander is known as a blood sugar lowering herb that does this by stimulating insulin secretion. This effect is so significant that it is also called anti-diabetic plant.

According to the statistics of 2015 over 3500 hectares out of 5000 hectares of coriander cultivated area in the

country are allocated to Nahavand city, based on which 6000 tons out of 7400 tons of coriander production in the country has been produced and exported in Nahavand [1].

According to the director of Nahavand Agricultural Jihad, coriander is one of the low-water crops produced at low cost. This plant is cultivated in Nahavand in autumn and spring for its profitable exports, and all its stages are mechanized, and an average of 2,300 kg is harvested per hectare [2].

More than 95% of the country's coriander is exported rawmany, including to Pakistan, Germany, the United Arab Emirates, and Pakistan, Germany, the United Arab Emirates, and many other Asian and European countries. The absence of processing on this product causes other countries to benefit from its high incomes. Due to the presence of brokers and intermediaries, farmers and producers usually earn the lowest amount of income from coriander exports [3].

Coriander can be used to prepare many food products and in addition to consumption in the domestic market it can also be exported abroad. For example, one of these products is coriander candy produced in several old workshops with high quality, flavor, and aroma in Hamadan province and can be exported (Figure 1).

In order to develop this medicinal plant and create added value and wealth out of it, it is necessary to put the processing and preparing various medicinal and food products from it on the agenda. Supporting the establishment of coriander processing factories and the provision of products in accordance with international standards will lead to the development of cultivation, job creation and the creation of appropriate added value [4].





**Figure 1.** Traditional packaging of coriander in the country

## 2. Biological Activities of Plants Grown and Collected in Iran

A bibliographic search was conducted, focusing on biological activities of plants collected in the Iranian territory. The purpose of this section is to collect data

related to scientific studies in order to evidence potential correlations between traditional treatments and proved biological activities of plants and phytocomplexes obtained from them. The results are summarized in Table 2.

**Table 2.** Biological activities of plants collected in the Iranian territory. Scientific name, family, type of extract, part of the plant used, Authors. (N.r. = not reported)

Scientific Name	Family	Plant Extrac	Part Used	Author
<i>Achillea millefolium</i>	Asteraceae	Methanolic extract	Aerial parts	10-11
<i>Alhagi maurorum</i> Medik.	Leguminosae	Methanolic extract (Lyophilized)	Leaves	12
<i>Beta vulgaris</i>	Amaranthaceae	Ethanollic extract	Aerial parts	13-14
<i>Cuminum cyminum</i> L.	Apiaceae	Methanolic extract (Lyophilized)	Leaves	12
<i>Dorema ammoniacum</i>	Apiaceae	Methanolic extract	Seeds	14
<i>Echinophora orientalis</i>	Apiaceae	Aqueous extract	Aqueous extract	14-15
<i>Etchium italicum</i>	Boraginaceae	Methanolic extract	Aerial parts	10-11
<i>Ferula assa-foetida</i>	Apiaceae	Methanolic extract	Seeds	14
<i>Ferula foetida</i> Regel	Apiaceae	Methanolic extract	Roots	17-18
<i>Ferula gummosa</i>	Apiaceae	Aqueous extract	Leaves	16
<i>Ferulago contracta</i>	Apiaceae	Methanolic extract	Seeds	14
<i>Lawsonia inermis</i> L.	Lythraceae	Methanolic extract (Lyophilized)	Leaves	14
<i>Malva sylvestris</i> L.	Malvaceae	Methanolic extract	Flowers	19
<i>Nasturtium microphyllum</i>	Brassicaceae	Aqueous extract	Leaves	16
<i>Nymphaea alba</i>	Nymphaeaceae	Methanolic extract	Leaves	12

L. <i>Perovskia abrotanoides</i>	Lamiaceae	(Lyophilized) Methanolic extract	Aerial parts	15
<i>Polygonum patulum</i> M. Bieb.	Polygonaceae	Ethanollic extract	Aerial parts	13-14
<i>Rheum ribes</i> L.	Polygonaceae	Methanolic extract (Lyophilized)	Leaves	12
<i>Rhus coriaria</i> L.	Anacardiaceae	Methanolic extract (Lyophilized)	Leaves	12
<i>Rumex obtusifolius</i>	Polygonaceae	Ethanollic extract	Aerial parts	13
<i>Salvia sahendica</i>	Lamiaceae	Methanolic extract	Aerial parts	10-11

Table 2. Cont.

Scientific Name	Family	Plant Extrac	Part Used	Author
<i>Satureja bachtiarica</i>	Lamiaceae	Hydro-distillation and ethanollic extract	Leaves and flowers	20
<i>Thalictrum minus</i>	Ranunculaceae	Methanolic extract	Aerial parts	10-11
<i>Thymus daenensis</i>	Lamiaceae	Hydro-distillation and ethanollic extract	Leaves and flowers	20
<i>Trachyspermum ammi</i> L	Apiaceae	Methanolic extract (Lyophilized)	Leaves	12
<i>Trachyspermum copticum</i>	Apiaceae	Aqueous extract, Methanol/petroleum benzene/diethyl ether extract	Aerial parts	21-22
<i>Trigonella foenum-graecum</i> L	Leguminosae	Methanolic extract (Lyophilized)	Leaves	12
<i>Verbascum Thapsus</i>	Scrophulariaceae	Aqueous extract	Leaves	16
<i>Xanthium brasilicum</i>	Compositae	Aqueous extract, Methanol/petroleum benzene/diethyl ether extract	Aerial parts	21-22
<i>Satureja bachtiarica</i>	Lamiaceae	Hydro-distillation	Leaves	22
<i>Scrophularia striata</i>	Scrophulariaceae	Infusion	Leaves and stems [	22
<i>Thymus daenensis</i>	Lamiaceae	Hydro-distillation	Leaves	23
<i>Trachyspermum ammi</i>	Apiaceae	Hydro-distillation	Fruits	23
<i>Zhumeria majdae</i>	Lamiaceae	Hydro-distillation	Aerial	24

<i>Ziziphus spinachristi</i>	Rhamnaceae	Infusion	parts Fruits	23
<b>Antimalarial Activity</b>				
<i>Citrullus colocynthis</i>	Cucurbitaceae	Methanolic extract	Fruits	25
<i>Physalis alkekengi</i>	Solanaceae	Methanolic extract	Leaves and fruits	
<i>Scrophularia frigida</i>	Scrophulariaceae	Dichloromethane extract	Aerial parts	26
<i>Solanum nigrum</i>	Solanaceae	Methanolic extract	Fruits	25
<b>Antioxidant Activity</b>				
<i>Convolvulus persicus</i>	Convolvulaceae	Methanol extract	Roots	27

Table 2. Cont.

Scientific Name	Family	Plant Extrac	Part Used	Author
<i>Heracleum persicum</i>	Apiaceae	n-Hexane extract (subsequently fractionated)	Roots	28-29
<i>Hyssopus angustifolius</i>	Lamiaceae	Ethyl acetate extracts	Stems, Leaves, Oves	30
<i>Hyssopus officinalis</i> L.	Lamiaceae	Ethyl acetate and n-butanol extracts	Aerial parts	31-32
<i>Mellilotus officinalis</i>	Leguminosae	Methanolic extract	Whole plant	33
<i>Primula heterochroma</i>	Primulaceae	Methanolic extract Ethyl acetate extract Methanolic extract	Leaves Roots	33
<i>Pyrus boissieriana</i>	Rosaceae	Methanolic extract	Leaves and steams	27
<i>Quercus infectoria</i>	Fagaceae	Methanolic extract	Galls	34
<i>Terminalia chebula</i>	Combretaceae	Methanolic extrac	Fruits	34
<i>Salix aegyptiaca</i> L.	Salicaceae	Methanolic extract	Male inflorescences	35
<i>Stachys inflata</i>	Lamiaceae	Methanolic extract polar and non-polar fractions	Aerial parts	36
<i>Tetrataenium lasiopetalum</i>	Apiaceae	Hydro-alcoholic extract	Laminas, Stems, Petioles, Fruits, Peduncle, Flowers	37
<b>Anticancer/Cytotoxic</b>				

		<b>Activity</b>		
<i>Anthemis mirheydari</i>	Compositae	Dichloromethane extract	Whole plant	38
<i>Euphorbia szovitsii</i> Fisch. & C.A. Mey.	Euphorbiaceae	Hydro-alcoholic extract	Aerial parts	39-40
<i>Ferula foetida</i> Regel	Apiaceae	Methanolic extract	Roots	17
<i>Ferula szowitsiana</i>	Apiaceae	Methanolic extract (fractionated)	Roots	42
<i>Hypericum scabrum</i>	Hypericaceae	Methanolic extract (fractionated)	Leaves	43
<i>Malva sylvestris</i> L.	Malvaceae	Methanolic extract	Flowers and leaves	19
<i>Medicago sativa</i>	Leguminosae	Hydro-alcoholic extract	Aerial parts	40-41
<i>Mentha lonigfolia</i>	Lamiaceae	Methanolic extract	Aerial parts	41
<i>Satureja bachtiarica</i>	Lamiaceae	Methanolic extract	Aerial parts	44

Table 2. Cont.

<b>Scientific Name</b>	<b>Family</b>	<b>Plant Extrac</b>	<b>Part Used</b>	<b>Author</b>
<i>Satureja hortensis</i>	Lamiaceae	Methanolic extract	Aerial parts	44
<i>Thymus daenensis</i>	Lamiaceae	Methanolic extract	Aerial parts	44
<i>Thymus vulgaris</i>	Lamiaceae	Methanolic extract	Aerial parts	44
<i>Urtica dioica</i>	Urticaceae	Hydro-alcoholic extract	Aerial parts	40-41
		<b>Antidiabetic Activity</b>		
<i>Heracleum persicum</i>	Apiaceae	n-hexane extract n-hexane extract (subsequently fractionated)	Aerial parts, roots Roots	27-28
<i>Parrotia persica</i>	Hamamelidaceae	Ethyl acetate and methanolic extract	Leaves	52-53
<i>Primula heterochroma</i>	Primulaceae	Methanolic and ethyl acetate extract	Leaves and roots	27
<i>Pyrus boissieriana</i>	Rosaceae	Methanolic, n-hexane, Ethyl acetate extract	Leaves and stems	27
<i>Salvia officinalis</i> L.	Lamiaceae	Hydro-alcoholic extract	Leaves	45
<i>Smilax excelsa</i>	Smilacaceae	Ethyl acetate and	Stems and	27

<i>Epilobium hirsutum</i>	Onagraceae	n-hexane extract n.r.	leaves Leaves	46
<i>Feijoa sellowiana</i>	Myrtaceae	Infusion and methanolic extract	Fruits and leaves	47
<i>Melilotus arvensis</i>	Fabaceae	n.r.	Leaves	47
<i>Pistacia lentiscus</i>	Anacardiaceae	n.r.	Gum	47
<b>Anti-Platelet Aggregation Activity</b>				
<i>Allium atroviolaceum</i>	Amaryllidaceae	Hydro-distillation	Aerial parts	48
<b>Inhibition of Mushroom Tyrosinase</b>				
<i>Quercus infectoria</i>	Fagaceae	Methanolic extract	Galls	34
<i>Terminalia chebula</i>	Combretaceae	Methanolic extract	Fruits	34

Table 2. Cont.

Scientific Name	Family	Plant Extrac	Part Used	Author
<b>Acetylcholinesterase-Inhibitory Activit</b>				
<i>Brassica nigra</i>	Brassicaceae	Aqueous-methanolic extract	Seeds	49-50
<i>Camellia sinensis</i>	Theaceae	Aqueous-methanolic extract	Leaves	49-50
<i>Citrus aurantifolia</i>	Rutaceae	Aqueous-methanolic extract	Fruits	49-50
<i>Peganum harmala</i> L.	Nitrariaceae	Methanolic extract, Dichloromethane extract	Seeds	51
<i>Prangos ferulacea</i>	Apiaceae	n-hexane extract	Aerial parts	52
<i>Rosa damascena</i>	Rosaceae	Aqueous-methanolic extract	Flowers	49-50-51
<i>Zizyphus vulgaris</i>	Rhamnaceae	Aqueous-methanolic extract	Fruits	49-50-51
<b>Antihyperlipidemic and Antihypertensive Activities</b>				
<i>Achillea wilhelmsii</i> C. Koch	Compositae	Hydro-alcoholic extract	Aerial parts	54
<b>Gastric Antiulcerogenic Activity</b>				
<i>Portulaca oleracea</i> L.	Portulacaceae	Aqueous extract Ethanol extract	Leaves	55
<b>Anti-Dyspepsia Activity</b>				
<i>Mentha pulegium</i>	Lamiaceae	Hydro-alcoholic extract	Leaves	56

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<b>Inhibitory Effect on Gastric Acid Output</b>				
<i>Achillea wilhelmsii</i>	Compositae	Aqueous-ethanolic extract	Aerial parts	57
<b>Anti-Colitic Activity</b>				
<i>Rosmarinus officinalis</i>	Lamiaceae	Hydro-alcoholic extract and hydro-distillation (EO)	Leaves	58

### 3. Conclusion

Some people are going to export saffron onions, whose production is monopolized by Iran by over 90 percent as the most expensive spice in the world, and other countries such as Spain and the UAE benefit it economically; Some people are looking to import and cultivate stevia, which is neither native to Iran nor has a unique particular position in the country's consumer market. Some seek to export high-yielding cultivars of damask rose from Iran to neighboring countries, while suitable varieties of damask rose have not yet found their proper place in the country; a group is also preparing herbal medicines that import its extract or essential oil from abroad. While the statistics regularly show the potential of native medicinal plants of the country and the existence of more than 2000 species of medicinal plants and diverse climates of the country, non-native species such as lavender, damask rose, and thyme are still used in the production of seeds and seedlings and extensive cultivation.

#### Conflict of interest

The author declares no conflict of interest.

#### Consent for publications

The author writes, reads, and approves the final manuscript for publication.

#### Availability of data and material

The Author declares that embedded all data in the manuscript.

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#### Orcid

Ali Salehi Sardoei:  
<https://www.orcid.org/0000-0002-4054-3750>

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