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Medicinal Plants of Iraq: Their Industrial Utilization (**)

Introduction

Since ancient times Iraq was known as the valley of Mesopotamia (the Tigris and Euphrates rivers). Its bountiful land, fresh water, varying climate and peculiar geographical position contributed to the creation of different environments that helped considerably the diversification of its flora.

The territory of the republic of Iraq, roughly the lower portion of Mesopotamia, lies between longitudes 38°42′ N and 48°23′ E and between latitudes 29°27′ N and 37°23′ N. The total land area of Iraq is computed as nearly 444,500 sq.km., of which well over half is a desert.

The primary division of our territory is divided into four main regions ecologically (Fig. 1).

1 - Mountain Region (M): This region is bound by the north and north-east frontiers of Iraq with Turkey and Iran respectively.

2 - Upper Plains and Foothills Region (F); the steppic sub-mountain belt.

3 - Desert Plateau Region (D); bound in the east and south-east by the right bank of the Euphrates.

4 - Lower Mesopotamian Region (L); the great alluvial plain comprising the remainder of the territory of Iraq [22].

The plants of Iraq are interesting; in this dry and arid region especially the herbaceous ones take a special condensed course of life compared with the plants

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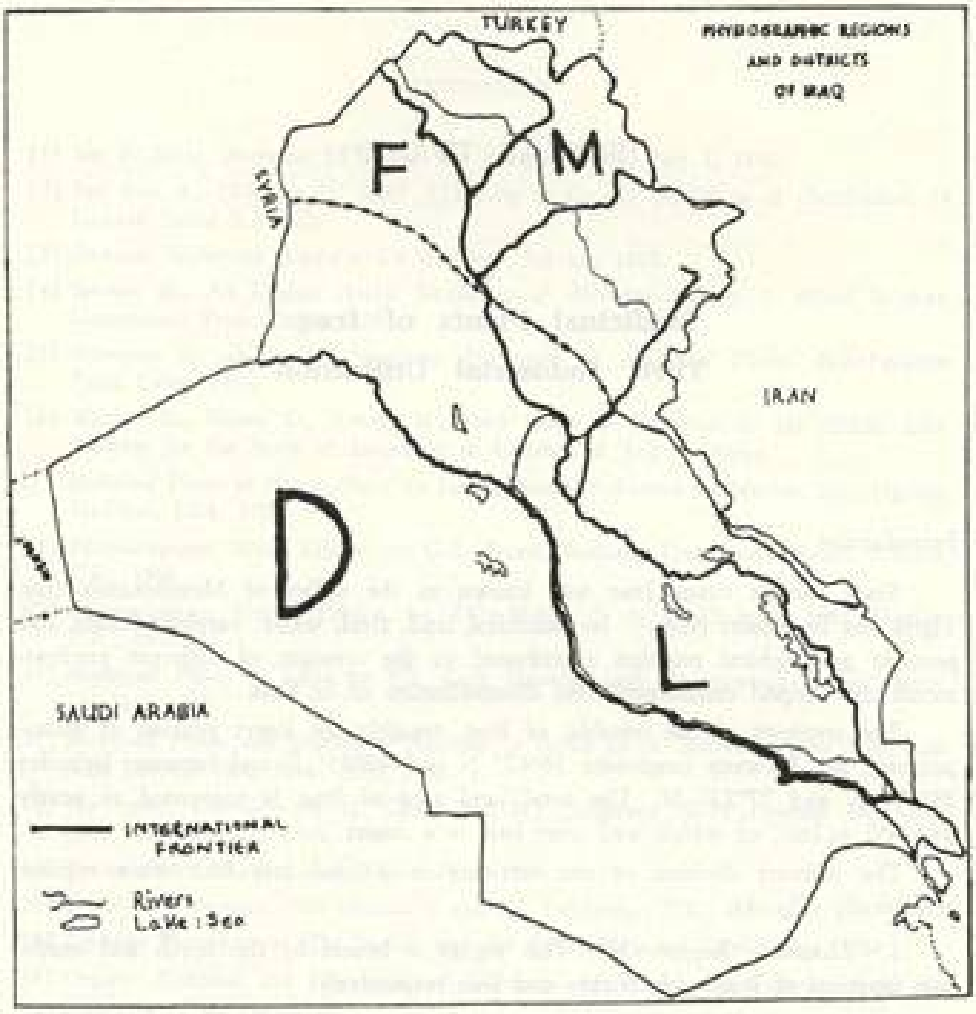

Fig. 1.

M: Mountain Region
F: Upper Plains and Foothill Region
D: Desert Plateau Region
L: Lower Mesopotamian Region

in mild and moderate climatic regions. About 3000 plant species have been recorded in Iraq. (They are 81 orders, distributed in 151 families of 837 genera). Most of them are herbaceous and shrubby plants in the extensive arid regions, the semidesert or desert expanse. Tall wild trees are few and they are found in the northern mountains. About 1500 economic plants have been recorded in Iraq. Quite large numbers of these are the medicinal and poisonous plants. It is estimated that of the 151 plant families found in Iraq there are 25 families including one or more official drugs. This means that 1/6 of the plant families are drug-

TABLE 1 — *The official Iraqi Drug-bearing Plant Families.*

1. Apocynaceae	9. Gnetaceae	17. Plantaginaceae
2. Chenopodiaceae	10. Graminae	18. Polygonaceae
3. Compositae	11. Labiatae	19. Ranoculaceae
4. Convolvulaceae	12. Leguminaceae	20. Rhamnoceae
5. Cruciferae	13. Liliaceae	21. Rosaceae
6. Dioscroreaceae	14. Malvaceae	22. Rutaceae
7. Ephedraceae	15. Myrtaceae	23. Scrophularaceae
8. Euphorbiaceae	16. Papaveraceae	24. Solanaceae
		25. Umbelliferae

bearing, which is a good ratio compared with the flora of other countries. Among these are such important families as Apocynaceae, Labiatae, Umbellifera, etc. (Table 1).

It has been found by analysis that drug plants growing in arid regions possess a higher alkaloid content or other active principles than those growing in moist regions. The truth of this has been established so far as Iraq plants are concerned; analysis of some of our wild drugs gave very satisfactory results.

Of the wild resources of drug plants, mention must be made of the following, which are reputed worldwide as pharmacopoeial drugs (Table 2). Of the important drug plants under cultivation, the following are worth mentioning (Table 3 and 7).

TABLE 2 — *Some of the Important Iraqi Drug plants.*

	Local Names
1. Achillea santolina	GAISUM
2. Ammi visnaga	KHAIZARAN
3. Anagallis arvensis	AIN AL JAMAL
4. Citrullus colocynthis	HANDHAL
5. Glycyrrhiza glabra	SUS
6. Artemisia spp.	SHIH SALMAS
7. Ephedra spp.	ALNADA
8. Astragalus spp.	KATHIRA
9. Bryonia dioica	ENAB AL HAYAH
10. Capparis spinosa	KABAR
11. Cressa cretica	SHUWAIL
12. Erodium cicutarium	BAKHITRY
13. Herniaria hirsuta	SHOWAIL
14. Hyoscyamus spp.	BANJ
15. Matricaria chamomilla	BABUNNEJ
16. Melilotus officinalis	NIFAL

(*continued*)

17. Haplophyllum propinquum	JAWAIFAH
18. Papaver spp.	KHASH = KHASH
19. Papaver major	LISAN AL HAMMAL
20. Papaver ovata	RIBLAH
21. Papaver psyllium	RIBLAH
22. Reseda lutea	THAIL ATH THIKH
23. Solanum dulcamara	ENAB AL THALAB
24. Tamarix mannifera	TARFA
25. Taraxacum officinale	HINDIBA BERRI
26. Tribulus terristris	HASACH
27. Uriginia maritima	U'NSUL
28. Vitex agnus castus	KAFF MARYAM
29. Xanthium strumarium	LIZZAIJ
30. Solanum nigrum	ENAB AL'THALAB
31. Peganum harmala	HARMAL
32. Chenopodium album	FISA AL KILAB
33. Plantago lanceolata	ADHAN-AS-SHKHLAH

TABLE 3 — *Some of the important Iraqi Drug plants* (under cultivation)

	English name	Local name
1. Allium cepa	Onion	BASAL
2. Allium porrum	Leek	KURRATH
3. Allium sativum	Garlic	THUM
4. Anethum graveolens	Dill, Sowa	HABBAT-HULWAH
5. Anthemis nobolis	Camomile	BABUNAQ
6. Apium graveolens	Celery	KRAFUS
7. Asparagus officinalis	Asparagus	HALYUM
8. Avena sativa	Oat	SHUFAN
9. Brassica rapa (B. campestris var. rapa)	Turnip —	SHALGHAM —
10. Capsicum annuum	Red Pepper	FILFIL
11. Carthamus tinctorius	Safflower	QURTUM
12. Carum carvi	Caraway	KARAUYA
13. Chrysanthemum cinerariifolium	Dalmatian-Pyrethrum	DAWUDI
14. Citrullus vulgaris	Watermelon	RAGGI
15. Citrus aurantifolia var. acida	Lime	NUMI-BASRA
16. Citrus limon	Lemon	NUMI-HAMIDH
17. Citrus medica	Citron	TURUNJ
18. Citrus nobilis var. limetta	Sweet-Lime	NUMI-HELO
19. Citrus sinensis	Sweet-Orange	PORTUAL
20. Citrus reticulata	Mandarin, Orange	LALINGI
21. Citrus aurantium var. amara	Seville, Orange	NARINJ

(*continued*)

22. Coriandrum sativum	Coriander	KUZBARAH
23. Crotalaria juncea	Sunn, Sunn-Hemp	QINNAB AL KROTALARYA
24. Cucumis melo	Melon	BATAIKH
25. Cucumis sativus	Cucumber	KHYAR-MAY
26. Cucurbita pepo	Vegetable-Marrow Field-Pumpkin	SHIJAR
27. Cuminum cyminum	Cumin	KAMMUN
28. Cydonia oblonga	Quince	SAFARJAL, HAIWAH
29. Daucus carota	Carrot	JEZAR
30. Digitalis spp.	Foxgloves	DIGITALIS
31. Dodonaea viscosa	Dodonia	DODONIA
32. Dolichos lablab	Lablab-Bean	LABLAB
33. Eucalyptus spp.		KALIBTOZ
34. Ficus carica	Fig	TEEN
35. Gossypium herbaceum	Cotton	QUTIN
36. Helianthus annuus	Sunflower	ABBAD-AL-SHAMS
37. Hibiscus esculentus	Okra	BAMIYA
38. Hibiscus rosa-sinensis	Shoe-flower	KHATMA SINIYAH, JEMAL
39. Hordeum vulgare	Barley	SHAIR
40. Lactuca sativa	Lettuce	KHASS
41. Lagenaria siceraria	Bottle gourd	QARA
42. Linum usittatissimum	Linseed	KITTAN
43. Luffa cylindrica	Sponge Luffa	LEAF
44. Melia azedarach	Persian Lilac	SIBAHBAH
45. Morus alba	White Mulberry	TUKKI, TUT
46. Nicotiana tabacum	Tobacco	TUTUN
47. Papaver somniferum	Poppy	KHASH-KHASH, ABO-AL-NOUM
48. Phoenix dactylifera	Date	TAMUR
49. Punica granatum	Pomegranate	RUMMAN
50. Ricinus communis	Castor oil	KHAIRWEH
51. Sesamum indicum	Sesame	SIMSIM
52. Vitis vinifera	Grapes	E'NAB

Excavations in the Shanadari cave, which is located in the northern part of Iraq, showed plant parts such as flowers were laid inside the graves of Neanderthal man, which dated back to more than 20 thousand years, indicating that they were used as medicine. The Babylonian, Sumerian and Aserian civilizations left behind a rich heritage of herbal medicine, in the form of writing on clay tablets. In the Islamic era, herbal medicine flourished, and among the famous herbalists were Avecena, Razi, Ebn-Al Baitar and others. This herbal heritage was lost and efforts were not made to improve the past medical heritage with modern medicine. Thus herbal medicine stayed as primitive practice mostly among the countryside people. Efforts have been made to revive the old medical heritage

in the form of research on Iraqi medicinal plants since the establishment of the School of Pharmacy in 1936, but the first ambitious attempt was made by establishing the Department of Pharmacognosy and Pharmacology within the Biological Research Centre in the Scientific Research Council in 1978. Today many Ph.D. holders in different areas of related sciences are working in this department. The approach of this department in developing new drugs from Iraqi medicinal plants is to examine the uses claimed for a traditional preparation, as well as to study the plants which are known to contain some active principles. As a result of this, a close correlation between the traditional uses of some Iraqi medicinal plants and their pharmacological and clinical applications was achieved. Tables 4 (a and b), 5 and 6 show some of the pharmacological and the phytochemical results obtained by our department from some of the Iraqi medicinal plants and mushrooms.

TABLE 4a — *Some of the pharmacological studies on Iraqi medicinal plants.*

Activity	Name of the plant	Part used	Ref.
1. *Analgesic*			
a. Positive results	+ Pimpinella anisum, F. Umbelliferae	(Seed)	[46]
	+ Tribolus terrestris, F. Zygophyllaceae	(Aerial)	[46]
b. Non-analgesic	— Achillea santolina, F. Compositae	(Aerial)	[46]
	— Anthemis cotula, F. Compositae	(Flower)	[46]
	— Centaurea behen, F. Compositae	(Aerial)	[50]
	— Centaurea phyllocephala, F. Compositae	(Aerial)	[50]
	— Jasminum officinale, F. Oleaceae	(Flower)	[46]
	— Prosopis farcta, F. Leguminosae	(Root and aerial)	[47]
2. *Anthelmentic*	+ Cocumis melo, F. Cucurbitaceae	(Seed)	[21]
	+ Cocumis sativus, F. Cucurbitaceae	(Seed, fruit)	[21]
	+ Cucurbita maxima, F. Cucurbitaceae	(Seed)	[21]
	+ Lagenaria siceraria, F. Cucurbitaceae	(Seed)	[21]
3. *Anti-aggressive*	+ Anchusa strigosa, F. Boraginaceae	(Flower)	[6]
	+ Anchusa italica, F. Boraginaceae	(Root)	[20]
	+ Anthemis nobilis, F. Compositae	(Flower)	[7]
	+ Jasminum officinale, F. Oleaceae	(Flower)	[8, 20]
	+ Lagerstroemia indica, F. Lythraceae	(Flower)	[8, 20]
	+ Withania somnifera, F. Solanaceae	(Berry)	[20]
4. *Anti-convulsant*	+ Oryza sativus, F. Graminae	(Polish)	[19]
5. *Anti-diabetic*	+ Artemisia herba alba, F. Compositae	(Aerial)	[40]
a. Positive effect			
b. No effect or Hyper-glycaemia	— Achillea santolina, F. Compositae	(Aerial)	[39]
	+ Achillea micrancha, F. Compositae	(Aerial)	[39]
	— Allium cepa, F. Liliaceae	(Bulb)	[1]
	— Allium sativum, F. Liliaceae	(Cloves)	[44]
	— Centaurea phyllacephala, F. Compositae	(Aerial)	[49]
	— Centaurea behen, F. Compositae	(Aerial)	[49]

(continued)

— and + signs mean negative and positive results respectively.

Activity	Name of the plant	Part used	Ref.
	– Crataegus azarolus, F. Rosaceae	(Aerial)	[48]
	– Myrtus communis, F. Myrtaceae	(Leaves, flower)	[32]
	– Prosopis farcta, F. Leguminoseae	(Whole)	[47]
6. *Anti-microbial*	– Aaron sohnia factorvsky, F. Compositae	(Aerial)	[23]
	– Achillea aleppica, F. Compositae	(Aerial)	[23]
	+ Achillea conferta, F. Compositae	(Aerial)	[23, 32]
	+ Achillea fragrantissima, F. Compositae	(leaves)	[23]
	– Achillea oligocephale, F. Compositae	(Aerial)	[23]
	– Achillea sataceo, F. Compositae	(Aerial)	[23]
	– Achillea vermicularis, F. Compositae	(Aerial)	[23]
	+ Allium cepa, F. Liliaceae	(Bulb, leaves)	[18]
	+ Allium porrum, F. Liliaceae	(Aerial)	[18]
	+ Allium sativum, F. Liliaceae	(Bulb)	[18]
	+ Anchusa strigosa, F. Boraginaceae	(Whole)	[32]
	– Anthemis cotula, F. Compositae	(Aerial)	[23]
	– Anthemis lepophylla, F. Compositae	(Aerial)	[23]
	+ Anthemis pseudocotula, F. Compositae	(Root, stem flower)	[23]
	– Anvillea garcini, F. Compositae	(Aerial)	[23]
	+ Artemisia hebo-alba, F. Compositae	(Whole)	[23]
	– Atractylis cancellate, F. Compositae	(Aerial)	[23]
	+ Biscutella ciliata, F. Crucifera	(Aerial)	[24]
	+ Brassica oleracea, F. Crucifera	(Aerial)	[24]
	– Calendula aegyptiaca, F. Compositae	(Aerial)	[23]
	– Calendula officinalis, F. Compositae	(Aerial)	[23]
	– Calendula persica, F. Compositae	(Aerial)	[23]
	+ Calligonium comosum, F. Polygonaceae	(Aerial)	[34, 35]
	+ Carthamus sp., F. Compositae	(Aerial)	[23]
	+ Capparis spinosa, F. Capparidaceae	(Whole)	[32]
	– Centaurea ammocyanus, F. Compositae	(Aerial)	[23]
	+ Centaurea behen, F. Compositae	(Aerial)	[23]
	+ Centaurea iberica, F. Compositae	(Aerial)	[23]
	+ Centaurea phyllocephala, F. Compositae	(Aerial)	[23]
	– Centaurea rigida, F. Compositae	(Aerial)	[23]
	+ Centaurea virgata, F. Compositae	(Aerial)	[23]
	– Chamaemelum sp., F. Compositae	(Aerial)	[23]
	– Chardinia orientalis, F. Compositae	(Aerial)	[23]
	+ Citrus sinensis, F. Rutaceae	(Exocarp)	[18]
	+ Citrus paralisi, F. Rutaceae	(Exocarp)	[18]
	+ Convolvulus arvensis, F. Convolvulaceae	(Whole)	[32]
	+ Ephedria foliata, F. Gentaceae	(Whole)	[32]
	+ Gundelia tournefrotii, F. Compositae	(Aerial)	[23, 34]
	+ Heliotropium europaeum, F. Boraginaceae	(Aerial)	[34]
	+ Heliotropium ramosissimum, F. Boraginaceae	(Root)	[32]
	+ Hypericum triquetrifolium, F. Hyericaceta	(Aerial)	[34, 35]
	+ Hyoscyamus reticulatus, F. Solanaceae	(Whole)	[32]
	+ Myrtus communis, F. Myrtaceae	(Leaves, fruit, flower)	[34, 35]
	+ Pimpinella anisum, F. Umbelliferae	(Seed)	[18]
	+ Prosopis farcta F. Leguminosae	(Flower, fruit)	[34, 35]

(continued)

– and + signs mean negative and positive results respectively.

Activity	Name of the plant	Part used	Ref.
	− Phagadiolus stellatus, F. Compositae	(Aerial)	[34, 35]
	+ Quercus infectoria, F. Compositae	(Gall)	[34, 35]
	+ Raphanus sativus, F. Crucifera	(Whole)	[24]
	+ Salvia acetabulosa, F. Libiatae	(Root, aerial)	[35]
	+ Salvia lanigera, F. Libiatae	(Root, aerial)	[35]
	+ Salvia spinosa, F. Libiatae	(Root)	[35]
	+ Salvia trichocloda, F. Libiatae	(Root)	[35]
	+ Salvia palaestina, F. Libiatae	(Whole)	[32]
	− Taraxacum montanum, F. Compositae	(Whole)	[23]
	+ Tanacetum argophyllum, F. Compositae	(Whole)	[23]
	+ Teucrium oliverianum, F. Labiatae	(Whole)	[32]
	− Tragopogon major, F. Compositae	(Whole)	[23]
	+ Vicoa pentagyna, F. Compositae	(Aerial)	[34]
	− Vicia hybridal, F. Compositae	(Whole)	[23]
	+ Xanthium brasilicum, F. Compositae	(Whole)	[23]
	+ Zoegea leptaurea, F. Compositae	(Fruit, seed and stem)	[34, 23]
7. *Anti-mutagenic*	Achillia santolina, F. Compositae	(Aerial)	[14]
a. (against polycyclic aromatic hydrocarbons)	Adiantum capilus-veneris, F. Polypodiaceae	(Aerial)	[14, 15]
	Anchusa strigosa, F. Boraginaceae	(Aerial)	[15]
	Artemisia herba alba, F. Compositae	(Aerial)	[15]
	Crataegus monogyna, F. Rosaceae	(Aerial)	[14]
	Myrtus communis, F. Myrtaceae	(Aerial)	[15]
	Salsola rosumarinus, F. Myrtaceae	(Aerial)	[14, 15]
b. (against nitrosamine comp.)	Artemisia herba alba, F. Compositae	(Aerial)	[14]
	Anchusa strigosa, F. Boraginaceae	(Aerial)	[14]
	Myrtus communis, F. Myrtaceae	(Aerial)	[14]
c. Carcinogenic	Ephedra foliata, F. Gnetaceae	(Aerial)	[16]
8. *Anti-Ulcer*	+ Teucrium polium, F. Labiatae	(Whole plant)	[41]
9. *Anti-Viral*	+ Acium graveoles, F. Umblifera	(Aerial)	[13]
a. Positive effect	+ Mentha peperita, F. Labiatae	(Aerial)	[13]
	+ Petroselinum sativum, F. Umbelliferae	(Aerial)	[13]
	+ Pimpinella anisum, F. Umbelliferae	(Aerial)	[13]
	+ Salvia spinosa, F. Labiatae	(Aerial)	[13]
b. No effect	− Achillea santolina, F. Compositae	(Aerial)	[13]
	− Artemisia herba alba, F. Compositae	(Aerial)	[13]
	− Brassica nigra, F. Cruciferae	(Aerial)	[13]
	− Centaurea behen, F. Compositae	(Aerial)	[13]
	− Convolvulus arevensis, F. Convolvullaceae	(Aerial)	[13]
	− Convolvulus scammonia, F. Convolvullaceae	(Aerial)	[13]
	− Matricaria chamomilla, F. Compositae	(Aerial)	[13]
	− Lepidium sativum, F. Cruciferae	(Aerial)	[13]
	− Cheiranthus cheiri, F. Cruciferae	(Aerial)	[13]
10. *Cardiovascular*			
a. Hypotension and bradycardia	Achillea santolina, F. Compositae	(Aerial)	[39]
	Achillea micrantha, F. Compositae	(Aerial)	[39]
b. Hypotension and positive inotropic	Allium cepa, F. Liliaceae	(Bulb)	[1]
	Allium sativum, F. Liliaceae	(Clove)	[44]
c. Hypotension followed by hypertension	Centaurea behen, F. Compositae	(Aerial)	[49, 50]
	Centaurea phylocephala, F. Compositae	(Aerial)	[49, 50]

(continued)

− and + signs mean negative and positive results respectively.

Activity		Name of the plant	Part used	Ref.
d. Hypotension, positive inotropic and anti-arrhythmic		Crataegus azarolus, F. Rosaceae	(Leaves, fruit and procyanidine fraction)	[5, 48]
e. Hypotension and negative inotropic and chrono		Myrtus communis, F. Myrtaceae	(Leaves and flower)	[51]
f. Hypotension		Prosopis farcta, F. Leguminosae	(Whole plant)	[47]
g. Hypotension and tachycardia		Tribulus terrestris, F. Zygophyllaceae	(Leaves and fruit)	[43]
11. *Diuretic*				
a. Positvie effect	+	Adiantum capillus, F. Polypodiaceae	(Whole plant)	[45]
	+	Cleome quinquenervia, F. Capparidaceae	(Aerial)	[45]
	+	Crataegus azarolus, F. Rosaceae	(Fruit)	[45]
	+	Tribulus terrestris, F. Zygophyllaceae	(Leaves and fruit)	[42]
b. Anti-diuretic		Achillea santolina, F. Compositae	(Aerial)	[39, 45]
		Capparis spinosa, F. Capparidaceae	(Aerial)	[45]
c. Non-diuretic	−	Anchusa strigosa, F. Boraginaceae	(Whole plant)	[45]
	−	Centaurea phyllocephalae, F. Compositae	(Whole plant)	[45]
	−	Echium italicum, F. Boraginaceae	(Aerial)	[45]
	−	Ephedra foliata, F. Gnetaceae	(Whole plant)	[45]
	−	Halocylon articulatum, F. Chenopodiaceae	(Aerial)	[45]
	−	Prosopis farcta, F. Leguminosae	(Whole plant)	[45]
	−	Quercus infectoria, F. Fagaceae	(Syringic acid)	[45]
	−	Salvia spinosa, F. Labiatae	(Root)	[45]
	−	Zea mays	(Hair)	[42]
12. *Oestrogenic* Non-Oestrogenic	−	Achillea santolina, F. Compositae	(Aerial)	[39]
13. *Toxicity*	+	Centaurea phylocephalae, F. Compositae	(Aerial)	[49]
14. *Intercicidal*	+	Achillea santolina, F. Compositae	(Aerial)	[Send for in press]
15. *Molluscicidal*	+	Tribulus terrestris, F. Zygophyllaceae	(Aerial)	[Send for in press]

− and + signs mean negative and positive results respectively.

TABLE 4b — *Some of the pharmacological and toxicological studies on some kinds of Iraqi Mushroom.*

Mushroom	Activity	Ref. No.
1. *Agaricus bisporus (J. Lange) Imbach.*	Toxicity	[3]
2. *Panaeolus papilionaceus (Bull. ex. Fr.)* Inotropic and Chronotopic Activity *(Coprinaceae)*	Toxicity, Hypotension, Negative	[53]
3. *Pleuratus ostreatus (Jacq. Fr.) Kummer*	Toxicity	[4]

TABLE 5 — *Some phytochemical studies on Iraqi medicinal plants.*

Name of the plant	Part used	Isolated compounds	Ref. No
1. Centaurea phyllocephala F. Compositae	Aerial	Four flavon methyl ether (hispidulin, nepetin, jaceosidin and cirsiliol)	[30]
2. Crataegus azarolus F. Rosaceae	Leaves, fruit and stem	Oligomeric procyanidine (cyanidines and epicatechin)	[29]
3. Eucalyptus camaldulensis F. Myrtaceae	Leaves	Vol. oil	[10, 11]
4. Haplophyllum tuberculatum F. Rutaceae	Aerial	Lignan	[26]
5. Helianthus annus F. Compositae	Root	Lignan	[26]
6. Heliotropium ramosissimum F. Poragenlaceae	Aerial	Alkaloids	[31]
7. Juniperus oxycedrus F. Compositae	Root	Lignan	[26]
8. Salvia palaestina F. Labiatae	Root	Quinones	[36]
9. Salvia spp. F. Labiatae	Aerial	Alkaloids	[37]
10. Thuja occidentalis F. Cupressaceae		Terepens, tannins, flavonoids, resins and vol. oil	[9]
11. Thuja orientalis F. Cupressaceae	Aerial	Lignan	[26]

TABLE 6 — *Some of the activities of Iraqi medicinal plants listed according to their names.*

Name of the plant	Activity	Ref.
1. Achillea coeferata	Anti-microbial activity	[23, 32]
2. Achillea fragrantissima	Anti-microbial activity	[23]
3. Achillea micrancha	Hypotensive, bradycardia, no-anti-diabetic activity	[39]
4. Achillea santolina	Hypotensive, bradycardia, no anti-diabetic activity	[39]
	no-analgesic, no anti-diabetic, anti-bacterial and no anti-viral and no oestrogenic activity	[13, 14, 39, 46]
5. Adiantum capillus	Diuretic activity	[14, 15, 45]
6. Allium cepa	Hypotensive, positive inotropic, no anti-diabetic and with anti-bacterial activity	[1, 18]
7. Allium porrum	Anti-bacterial activity	[18]
8. Allium sativum	Hypotensive, positive inotropic, no anti-diabetic and with anti-microbial activity	[18, 44]

(*continued*)

Name of the plant	Activity	Ref.
9. Anchusa italica	Anti-aggressive activity	[20]
10. Anchusa strigosa	Anti-aggressive, no diuretic, anti-bacterial and anti-mutagenic activity	[6, 14, 15, 32, 43]
11. Anthemis cotula	No analgesic and no anti-bacterial activity	[23, 46]
12. Anthemis lepophylla	No anti-bacterial activity	[23]
13. Anthemis nobilis	Anti-aggressive activity	[7]
14. Anthemis pseudocotula	Anti-microbial activity	[23]
15. Anvillea garcini	No anti-bacterial activity	[23]
16. Apium graveolens	Anti-viral-activity	[13]
17. Artemisia herba-alba	Anti-diabetic, anti-mutagenic, and anti-microbial activity	[13, 14, 17, 23]
18. Atractylis cancellate	No anti-bacterial activity	[23]
19. Biscutella aliate	Anti-bacterial activity	[24]
20. Brassica nigra	No anti-viral activity	[13]
21. Brassica oleraceae	Anti-bacterial activity	[24]
22. Calendula aegypiaca	No anti-bacterial	[23]
23. Calendula officinale	No anti-bacterial	[23]
24. Calendula persica	No anti-bacterial	[23]
25. Calligonium comosum	Anti-bacterial	[34, 35]
26. Capparis spinosa	Anti-diabetic, anti-bacterial	[32, 45]
27. Carthamus sp.	Anti-bacterial	[23]
28. Centaurea ammocyanos	No anti-bacterial	[23]
29. Centaurea behen	Hypotension followed by hypertension, no analgesic, no anti-diabetic, anti-bacterial, and no anti-viral	[13, 23, 49, 50]
30. Centaurea iberica	Anti-bacterial	[23]
31. Centaurea phyllocephala	Hypotension followed by hypertension, no anti-diabetic, no analgesic, no diuretic, anti-bacterial and toxicity	[23, 45, 49, 50]
32. Centaurea rigida	No anti-bacterial	[23]
33. Centaurea virgata	Anti-bacterial	[23]
34. Cheiranthus cheiri	No anti-viral	[13]
35. Chamaeselum sp.	No anti-bacterial	[23]
36. Chardinia orientalis	No anti-bacterial	[23]
37. Citrus sinensis	Anti-bacterial	[18]
38. Citrus paralisi	Anti-bacterial	[18]
39. Cleome quinquenervia	Diuretic	[15, 45]
40. Convolvulus arevensis	No anti-viral	[32]
41. Convolvulus scammonia	No anti-viral	[13]
42. Crataegus azarolus	Diuretic, hypotensive and positive inotropic, anti-arrhythmic, no anti-diabetic	[5, 45, 48]
43. Crataegus monogyna	Anti-mutagenic	[14]
44. Cucumis melo	Anthelmentic	[21]
45. Cucumis sativus	Anthelmentic	[21]
46. Cucurbita maxima	Anthelmentic	[21]
47. Echium italicum	No diuretic	[45]

(continued)

Name of the plant	Activity	Ref.
48. Ephedria foliata	No diuretic, anti-bacterial, carcinogenic	[16, 32, 45]
49. Gundelia tournefotii	Anti-bacterial	[23, 34]
50. Haloxylon articulatum	No diuretic	[45]
51. Heliotropium europaeum	Anti-bacterial	[34]
52. Heliotropium ramosissimum	Anti-bacterial	[32]
53. Hypericum triquetrifolium	Anti-bacterial	[34, 35]
54. Hyoscyamus reticulatus	Anti-bacterial	[32]
55. Jasminum officinale	Anti-aggressive, no analgesic	[8, 20, 46]
56. Lagenaria siceraria	Anthelmentic	[21]
57. Lagerstroemia indica	Anti-aggressive	[8, 20]
58. Lepidum sativum	No anti-viral	[13]
59. Matricaria chamomilla	No anti-viral	[13]
60. Mentha peperita	Anti-viral	[13]
61. Myrtus communis	Hypotensive and negative inotropic and cronotropic, no anti-diabetic, anti-bacterial and anti-mutagene	
62. Oryza sativa	Anti-convulsant	[19]
63. Petroselium sativum	Anti-viral	[13]
64. Pimpinella anisum	Analgesic, anti-bacterial, anti-viral	[18, 34, 46]
65. Phagadiolus stellatus	No anti-bacterial	[23]
66. Prosopis farcta	Hypotensive, no diuretic, no analgesic, no anti-diabetic, antibacterial	[35, 45, 47]
67. Quercus infectoria	No diuretic, anti-bacterial	[34, 35, 45]
68. Raphanus sativus	Anti-bacterial	[24]
69. Salsola resumarinus	Anti-mutagenic	[23]
70. Salvia acetabulosa	Anti-bacterial	[35]
71. Salvia lanigera	Anti-bacterial	[35]
72. Salvia palaestina	Anti-bacterial	[32]
73. Salvia spinosa	No diuretic, anti-viral, anti-bacterial	[35]
74. Salvia trichocloda	Anti-bacterial	[35]
75. Taraxacum montanum	No anti-bacterial	[23]
76. Tanacetum argrophyllum	Anti-bacterial	[23]
77. Teucrium polium	Anti-ulcer	[32, 41]
78. Teucrium oliverianum	Anti-bacterial	[32]
79. Tragopogon major	No anti-bacterial	[23]
80. Tribulus terrestris	Hypotension and tachycardia, analgesic, diuretic	[42, 45, 46]
81. Vicia pentagyna	Anti-bacterial	[34]
82. Vicia hybridal	No anti-bacterial	[23]
83. Withania somnifera	Anti-aggressive	[20]
84. Xanthium brasilicum	Anti-bacterial	[23]
85. Zea mays	No diuretic	[42]
86. Zoegea lepcaurea	Anti-bacterial	[23, 34]

TABLE 7 — *Drug plants which showed their suitability for cultivation and production in Iraqi medicinal plant farm.*

1. Achillea millefolium	8. Brassica nigra	15. Digitalis lanata
2. Aloe arboreseum	9. Carum carvi	16. Ephedra equisetina
3. Ammi visnaga	10. Cacia acutifolia	17. Hyoscyamus niger
4. Anethum graveolem	11. Chenopodium ambrosiodes	18. Mentha piperita
5. Apocynum cannabium	12. Coriandrum sativum	19. Matricaria chamomilla
6. Artemisia absinthium	13. Datura innoxia	20. Papaver somniferum
7. Atropa belladonna	14. Datura stramonium	21. Pimpinella anisum
		22. Plantago indica

Additionally some plant extracts (volatile oil, pigments, etc.) have been incorporated in cosmetics and toiletries (Table 8).

Licorice root has been collected on a large scale to be utilized in a state-owned factory. The farmers collected it while plowing the land since this plant is considered a weed and grows well on the river banks. The powdered water extract is exported. In addition to that, six volumes of flora of Iraq were published, which are:

Volume 1. Introduction [22];

Volume 2. the general key of families and Pteridophyta, Gymnospermae and the Rosaceae from the Angiospermae;

Volume 3. dealing with Leguminales;

Volume 4. two parts including 70 families, Cornaceae to Residaceae;

Volume 8. monocotyledonae, with the exception of Gramineae;

Volume 9. Gramineae.

In addition to these volumes, the *Plant Wealth of Iraq, Volume 1*, was published [17].

TABLE 8 — *Some application of Iraqi medicinal plants in industry and toiletries.*

Application	Name of the plant	Part used	Ref. No
1. Antiseptic cream	Eucalyptus camaldulensis F. Myrtaceae	(Oil of leaves)	[10, 11]
2. Dry shampoo-anti-dandruff	Thuja occidentalis F. Cupressaceae	(Leaves and small twigs)	[9]

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