Pak. J. Bot., 47(2): 551-570, 2015.

PROSPECTS OF WILD MEDICINAL AND INDUSTRIAL PLANTS OF SALINE HABITATS IN THE JORDAN VALLEY

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Abstract

A field survey of wild medicinal and industrial plant species in saline habitats in the area extended along 75 km in the Jordan Valley was carried out during 2010. Results showed occurrence of 263 species of ~~59~~ 62 plant families in the region. The highest numbers were belonging to Compositae (48 species), Gramineae (18 species) and Chenopodiaceae (15 species). Species were different in densities, frequency, and distribution among and between study sites. Many important halophytes were growing in marsh and saline soils, wadies and wadi beds, along saline or in brackish water streams. Life form, biology, ecology, and physiological, phytochemical and anatomical mechanisms of adaptation/resistance, economical values and distribution of most common species were evaluated and discussed. General comments on the recorded species, medicinal values and potential inclusion for reclamation of the salt-effected soils were considered.

Key words: Halophytes, industrial species, Jordan Valley, Medicinal and aromatic species, salinity, survey, wild plants.

Introduction

Irrigated agriculture in arid and semi-arid regions faces problem of soil salinization. Almost 10% of the world's land surface is affected at certain degree by soil salinity (Szabolics, 1989). Salinity causes great changes on natural vegetation, agriculture and environment and has forced farmers worldwide to leave salt-effected farmlands. This situation is usually followed by desertification and abandonment of agriculture.

Jordan Valley is the main irrigated agricultural area in Jordan, measures 360 km in length and extended from Gulf Aqaba to Lake Tiberias. It is located at -212 to -400 m b.s.l. with hot and dry weather in the summer and warm rainy during the winter. Average temperature ranges between 31°C and 39°C while average annual rainfall between 380 and 71 mm in the north and south, respectively.

Salinity at a large area becomes apparent in the last two decades due to drop in water quality and intensive agriculture. This problem is more extenuated as non-saline soils and water become more intensively and extensively exhausted and exploited. However, salinity problem may be encountered through different water and agricultural managements and by remediation measures including, selection of well adapted plant species (Kim *et al*., 2012), drainage, and soil conditioners.

The ability of some halophytes to produce and develop under highly saline conditions and their importance for food and feed has been well documented (Felger & Mota-Urbina, 1982). The potential use of certain species as source for fuel and fodder is under investigation worldwide. However, the adaptation and modern cropping of these halophytes, where possible, can create a major source of feed, fodder, food at low cost and industry and could play a role in halting the expansion of soil salinization and thus desertification (Bunney, 1986; Glantz, 1999).

Halophytes have structural and functional adaptations (Poljakoff-Mayber & Gale, 1975). Knowing their various responses to salinity and understanding the nature of the damage caused to vegetation are important. Currently, an increasing interest worldwide is granted to these species because of their high content in bioactive compounds (Qasem, 1997; Shinwari & Gilani, 2003; Ksouri *et al*., 2012). Sustainable management practices aimed at revegetating abandoned and salt-effected soil by expanding cultivation of naturally occurring medicinal and aromatic halophytes would make agriculture possible in the region as well as in saline land in the whole country.

Similar to studies carried out in Lebanon (Deeb *et al*., 2013) and in Pakistan (Qasim *et al*., 2010; Shinwari & Qaisar, 2011), the present work was conducted and aimed at surveying wild medicinal and aromatic species in saline land in the Jordan Valley, identifying of useful halophytes, evaluate economic values, discuss their tolerance/resistance to saline conditions and possible adaptation mechanism/s.

Materials and Methods

A field survey of wild medicinal and aromatic plant species in saline habitat extended from Wadi Kufrinja (north) to Zara (south) was carried out during 2010. The studied area extended 75 km parallel to the Jordan River and the Dead Sea, and varies in width from 10 km at Wadi Hisban and Wadi Zarqa to about 2-3 km in Zara according to the site location and the head start of salinity.

Studied sites and water quality are shown in Table 1. The total number of sites was 10 with total study stations of 34. The survey was carried out within as well as among sites through cross sections and longitudinally assigned stations parallel (west to east) to the Jordan River. Where vegetation was low, the station size was increased to cover a larger area. The number of stations in each site was determined according to the size of the study area and richness of plant community, with higher number in large and heavily vegetated sites. However, in many sites, study stations were overlapping.

In each site, species were identified within a circle of 1-1.5 km diameter; photographed and fresh complete samples of most important species were dried, mounted on cartoon, preserved and kept as an index of species in the region.

Table 1. Irrigation water quality and other saline water source of the study area (Adopted from JVA).

Location	Water source	EC ds/m	pH	Na Meq/L	Cl Meq/L	Discharge MCM/Yr
Wadi Kufrinja (from Ain Seidieah down to the Jordan River)	Ain Seidieah	3.35	7.88	10.80	21.38	5.00
Ain Nkhiel (from the main Ain down to Ardani road)	Ain Nkhiel	3.52	8.40	12.80	15.58	0.90
Seil Zarqa-Muadi (from the main diversion weir, about 6 km east to the King Abdullah canal down to the Jordan River)	Seil Zarqa-Muadi	6.54	7.75	40.50	37.34	8.20
Dahret Alramel-well no. 2 (from around JICA Well No. 2 down to the main road)	Dahret Alramel-Well No. 2	15.2	6.57	108.00	116.70	0.89
Bassat Al-Farass to well no. 3 (from around JICA Wells No. 3 and 4 and side wades down to Al-Karama Reservoir Diversion Station)	Bassat Al-Farass Well No. 3	8.33	7.72	52.00	45.30	0.93
	Karama Dam	3.63	8.73	13.80	24.00	> 35
the 14.5 km extension area (cross section from 1.5 km south of Al-Karama to Sweimeh, and from Al-Ghor main road, down to Al-Zor or the Dead Sea)	Bassat Al-Farass Well No. 4	13.1	6.65	96.00	87.80	0.55
Seil Hisban (after dam from below the new diversion weir down to the Jordan River and around JICA-Well No. 5)	Seil Hisban (after dam)	4.00	7.44	26.80	22.71	1.40
	Zoor Shesha`a	6.08	8.20	35.40	40.66	location on River Jordan
	Hisban Well No. 5	8.68	6.12	57.80	64.00	2.85
Swiemeh (from around JICA Well No.6 and the main Swiemeh spring down to the Dead Sea)	Swiemeh Well No.6	7.97	6.16	52.10	56.00	1.10
	Swiemeh Spring	5.90	7.01	26.80	44.80	1.20
Zara (from Springs 2 and 22 down to the main road and wadi Almujib).	Wadi Almujib	2.43	8.23	9.81	15.30	38.00

JVA: Jordan Valley Authority

Results

The present study revealed presence of 263 wild medicinal and aromatic species of 62 plant families (Table 2). The highest numbers were belonging to Compositae (48 species), Gramineae (18 species), and Chenopodiaceae (15 species). However, many plant families were found but not represented by more than one or two species (Table 2).

High variations in species numbers, life forms, and types were recorded while certain locations were ecologically eroded (Dahrret Al-Ramel, Wells No. 3, 4, 5, and 6). Of all sites, the fore mentioned locations were highly saline with irrigation water EC (dS/m) values 15.2, 8.33, 13.1, 8.68 and 7.97, respectively (Table 1).

Certain species were prevailing in different sites while others were confined to specific locations. Density varied between and within species in study stations of the same site. Abundant species in certain stations declined or disappeared toward the Jordan River and the opposite was true for some others. However, for better evaluation of species, the following groups were distinguished based on their economical values.

1. Medicinal species: Many are produced in different parts of the world as natural sources of drugs and medicines or for use in folk medicine (Table 2). Other species are less utilized and extremely poisonous medicinal plants.

2. Edible and culinary medicinal plants: These included grains, kitchen herbs, vegetables, fruits or flavoring agents. Many halophytes produce grains relatively free of excessive salts and can be used as food and in feed or processed to produce oil. Grains proteins of certain halophytes exceed 20% and fat 10-50% (Qasem, 1999). Several wild medicinal-leafy vegetables and spices were also recorded (Table 2). These are usually used by inhabitants in different medications and food forms. Species of edible fruits have been also recorded. Fruits of other species are usually eaten because of richness in vitamin C and flavoring substances.

3. Aromatic plants: These contain substances that have essential oils mainly in aerial parts or seeds. They are flavoring agents give aroma to food or used in drugs preparations.

4. Fuel plants: These are shrubs or trees recorded in different study sites on saline soils or water.

5. Fiberous plants: Some are used for fiber and leaf nutrients production, others in production of fibers for paper pulp, source of wax, and mats production.

6. Phytochemicals: These are of essential oils, flavouring agents, fragrance gums, or resins. Gums and bioactive compounds may be derived from certain species. Fruits of other species are rich in edible oil and protein and many containing allelochemicals can be used in crude forms or as precursors of pesticide industry.

Table 2. Latin name, medicinal and industrial wild plant species found in all saline sites of the study area and their economic values.

Scientific name	Family name	Medicinal and other industrial and economical values
Blepharis ciliaris (L.) Burtt	Acanthaceae	Root powder for feeble sight, against cataract, anti-inflammatory, disinfectant, diuretic, aphrodisiac and hemorrhoids. Wild flower.
Adiantum capillus-veneris L.	Adiantaceae	Asthma, coughs and chest pain, emollient, diuretic, expectorant, antidandruff, and for scorpion bites. To treat, bronchitis and pneumonia. Refrigerant and tonic. An ornamental.
Aizoon canariense L.	Aizoaceae	Inflammation, skin diseases, antioxidant, emetic. Grain is pounded and eaten or ground and cooked into gruel by Bedouins. Leaves are edible. Seeds, cereal starch based preparations, porridges. Poultice, deodorant and anti-inflammatory. Bark gives body protection. An ornamental species.
Aizoon hispanicum L.	Aizoaceae	Inflammation. An ornamental species.
Amaranthus albus L.	Amaranthaceae	Emollient, extracts for *Cuscuta campestris* control. Wild flower.
Amaranthus blitoides S. Wats.	Amaranthaceae	Emollient. For scorpion stings, snakebites, dermatitis. Leaves are rich in minerals & vitamins and used as spinach. *Amaranthus* spp. are not poisonous but when accumulate nitrates which are implicated in stomach cancers, blue babies and some other health problems. A wild flower and common weed.
Amaranthus gracilis Desf.	Amaranthaceae	A decoction to stop dysentery and inflammation. Emollient, astrigent and vermifuge. Root juice for inflammation during urination and to treat constipation. Dyes can be obtained from the whole plant. Leaves, leafy stems and flower clusters are cooked as a spinach. Seed cooked and very nutritious, contains 14 - 16% protein and 4.7 - 7% fat. It is a common weed.
Amaranthus retroflexus L.	Amaranthaceae	Anti-rheumatic, hemorrhaging, diarrhoea, and to treat ulcerated wound. Certain species of *Amaranthus* are astringent for external wounds, sores, and ulcers. The leaves were used in washing of bandages and other fabrics. A tea made from the leaves for stomachache and to wash arthritic parts of the body. Treatment of profuse menstruation, intestinal bleeding. Decoctions to kill and expel intestinal worms. To treat mouth and throat inflammations and quelling dysentery. Amaranth may have antioxidant properties. Infusion to treat hoarseness. Young leaves - raw or cooked as a spinach. A mild flavor, very rich in iron and a good source of vitamins A and C. Seeds as a cereal substitute, it can also be added as a flavor to salads or after roasted to maize meal, it is very nutritious. Pollen causing respiratory allergy. A common weed.
Rhus tripartita (Ucria) Grande	Anacardiaceae	Bark and leaf for gastrointestinal ailments. The infusions of fruits and leaves for gastric and intestinal ailments. Fruits are edible.
Nerium oleander L.	Apocynaceae	A source of cardiac glycosides. For bronchitis, cough, sinus problems, jaundice, bone fractures, skin diseases, mouth-ulcers, dental and ENT analgesic, anti-migraine, antidiabetic and against hair loss. An ornamental. It is poisonous common in wades. .
Calotropis procera (Ait.) Ait. f.	Asclepiadaceae	Smoked leaves for asthma and cough. The latex for ringworm, dog bitten wounds and skin diseases, also in tanning industry. The plant is analgesic, diaphoretic and emetic, for difficult breathing, pain, and scorpion stings. Fixing agent for perfumes. It is a source of natural chemicals; bitter sap is traditionally dried and used to fill aching tooth cavities. Leaves poultices to heal rheumatism, skin diseases, paralysis and coldness. Powder of roots and flowers to cure rheumatoid arthritis and dysentery and paste for leucoderma. Boiling water of roots mixed with wheat flour, butter and sugar used to cure gastric troubles. A wild flower.
Cynanchum acutum L.	Asclepiadaceae	Decrease the ulcer index; purgative, antidiabetic and antioxidant. Latex for skin and eye problems. Seeds are edible. Extract of aerial parts has antiulcerogenic effects. An ornamental.
Pentatropis spiralis (Forssk.) Decne	Asclepiadaceae	Emetic, astringent and to treat gonorrhea. Root powder for local fever, dysentery and indigestion. A climber wild flower.
Periploca aphylla Decne	Asclepiadaceae	Anodyne, dermatitis, tumors, swellings, abortifacient, burns and rheumatism. It has cardiotonic properties. A wild flower.
Balanites aegyptiaca (L.) Del.	Balanitaceae	Antiseptic, burns, arthritis, colic, cough, herpes, hypertension, malaria, rheumatism, syphilis, anthelmintic and purgative. Oil is used in soap manufacturing. Fruits for kidney diseases, source of sweet and have bitter taste in raw. Fruit pulp to cure tuberculosis and for neuralgia, local paralysis, dizziness, wounds, aching joints and varicose veins. Endangered species in Jordan.
Alkanna strigosa Boiss. X	Boraginaceae	Source for red dye and polymers, in the synthesis of drugs, pesticides and other chemicals, plant hormone, commercial propane, pentane and octane, methane and paraffin wax. A wild flower.
Anchusa italica Retz.	Boraginaceae	Aerial parts for injuries, ulcers, sciatica, as compresses, and internally as a mild expectorant. Twigs are partially edible. It is a source of nectar for honey bees and treated as a common weed.
Anchusa strigosa Banks & Sol.	Boraginaceae	Fever, skin and respiratory system diseases, weariness, exhaustion, temporary paralysis, astringent for burns and wounds, anti-ulcer, cough, rheumatic pain and blood cleaner. Twigs are partially edible, and the plant is a source of nectar for honey bees. A common weed.
Borago sp.	Boraginaceae	Emollient, expectorant, febrifuge, anti-rheumatic, demulcent depurative, diuretic, hypotensive, lenitive, pectoral, poultice sedative, tonic, adrenal gland stimulant and anti-inflammatory. Leaves for respiratory infection and fever. Young twigs are edible. It is a wild flower.
Echium judaeum Lacaita	Boraginaceae	Snake bites, diaphoretic, analgesic and aphrodisiac. It is a wild flower.

Table 2. (Cont'd).

Heliotropium europaeum L.	Boraginaceae	Emetic, hepatic and for liver ailments. A Wild flower and a poison weed.
Lithospermum arvense L.	Boraginaceae	Diuretic. It has proved efficient in both acute and chronic cystitis.
Campanula strigosa Banks & Sol.	Campanulaceae	Mouth and throat diseases treatment. Wild flower and weed.
*Capparis decidua (*Forskal) Edgew	Capparidaceae	Anthelmintic, laxative, Asthma, hearing problems, constipation, coughs, hysteria and other psychological problems, worms. Fruits prickles used as tonic, strengthen, and to cure gastric trouble. Green stem paste used to cure boils. Root barks to cure cough and cold. Wild Flower.
Capparis galeata L.	Capparidaceae	Anthelmintic, analgesic, aphrodisiac, carminative, diaphoretic, emmenagogue and laxative. Small pods are pickled and canned. It is a wild flower
Capparis spinosa L.	Capparidaceae	Anthelmintic, diuretic, expectorant, stimulant, tonic and condiment. For coughs, diabetes, earache, deafness and back diseases, worms, arteriosclerosis, chills, renal disinfectant and tonic. For colds, headache, hypertension, rheumatism, skin buttons, general pains, neuralgia, male and female infertility. Root bark in a poultice for spleen problems and hemorrhoids, leaves in a drug for spirits and bark for arthritis. A tea from the plant is emetic and to treat indurations and scrofula and disorders of the liver and spleen. Wild flower.
Dianthus caryophyllus L.	Caryophyllaceae	Flowers are aromatic. The oil is aphrodisiac; however, oil can irritate sensitive skins, used also as a decorative, fragrant, medicinal, flavoring herb. It is a good bee herb. Wild flower.
Gypsophila arabica Barkoudah	Caryophyllaceae	Tonic, diaphoretic alternative and for skin diseases. Wild flower, weed.
Paronychia argentea Lam.	Caryophyllaceae	Heart pains, diabetes, blindness, kidney stones, and diuretic. An infusion of the leaves is aphrodisiac. It is also used in the treatment of TB. Wild flower, forage species.
Spergularia diandra (Guss) Heldr. Et Sart	Caryophyllaceae	Expectorant, sedative and diuretic. It is a weed.
Stellaria media (L) Vill.	Caryophyllaceae	In folk medicine as a remedy for skin diseases, bronchitis, rheumatic pains, arthritis and period pain. A poultice can be applied to cuts, burns and bruises. Its tea is an old remedy for obesity and as spring tonics to clean the blood. Poultices to minor burns, skin irritations, and rashes particularly when associated with dryness and itching, it speeds healing. The plant can be eaten in salads and may be fed to companion animals to assist in the expulsion of hair balls, and sooth the digestive tract. It is a gentle laxative. The seeds are food for finches and many other birds. Relief for symptoms of coughs, colds and inflammation, rich in vitamin c and minerals. Helps remove toxins from the body, blood purifier and dissolves plaque in blood vessels.
Casuarina equisetifolia L.	Casuarinacea	Astringent, diuretic, emmenagogue, a remedy for beri-beri, colic, cough, diarrhoea, dysentery, headache, nerves, pimples, sores, sore throat, stomachache, swellings, and toothache. It is laxative and tonic. The seeds are used for passing blood in diarrhoea. It is a forest species.
Cassia italica (Mill.) Lam.	Ceasalpiniaceae	Biliousness, constipation, dermatosis, gout, functional claims and purgative. Leaves are used as tannins and the crushed sample applied on head for common cold. Leaves paste applies externally on hooves, and infusion given internally in foot-and-mouth disease. Leaves and jiggery is given to cure tympanities. It is a wild flower.
Cassia senna L.	Ceasalpiniaceae	Biliousness, constipation, dermatosis, gout and purgative. Insect and bees repellent, and thus good for honey harvesting without using smoke, strong cathartic though poisonous in high quantities. A wild flower.
Anabasis articulata (Forssk.) Moq.	Chenopodiaceae	Edema, insect repellant, surfactant and respiratory system stimulant. Used to make antiseptic soap from the ash of the plant to treat ectoparasites and eczema. It is a forage species.
Atriplex halimus L	Chenopodiaceae	Heart disorder, diabetes, emetic, in the treatment of type 2 diabetes. The effect may be partly due to the chromium that improves blood sugar control. The ash is used for manufacturing of soap while shepherds sometimes eat the leaves in salads. A forage common species.
Atriplex leucoclada Boiss	Chenopodiaceae	Molluscicidal activity. A hedge, border and soil binding. A forage common species.
Chenopodium album L.	Chenopodiaceae	Anti-rheumatic, excellent remedy for kidney trouble, antipyretic, antinociceptive (fruit ethanol extract). Leaves are spinach substitute, and as a carminative. The leaves are very nutritious but large quantities can disturb the nervous system and cause gastric pain, raw leaves however, may be toxic. Seed dried and ground into a meal and eaten raw or baked into bread or can be added to salads; however, seeds should be soaked in water and washed to remove any saponins. The seed contains about 49% carbohydrate, 16% protein, 7% ash. Young inflorescences – cooked which has a tasty broccoli substitute. When used in combination with seawrack will bring splendid results in weight loss. Nettle tea is good for colds and fevers. It is an excellent remedy for dandruff and bring back natural hair color. It is sweet, digestive and laxative and used in peptic ulcer, cardiac disorder and spleen disorder. The roots are used in jaundice and urinary diseases. Fruit and root are known as antidote to snake poison. It is a weed, poisonous when accumulate nitrate.
Chenopodium ambrosioides L.	Chenopodiaceae	Vermifuge and an arbortifacient, leaves infusion is digestive, carminative, stimulant, stomachic and antiasthmatic. Diuretic, anthelmentic, antispasmodic, and emmenagogue. Essential oil has stomachic and tonic properties. Recommended for nervous and menstrual disorders. Oil is used against roundworm and hookworm. It is well known species of drink and medicinal properties. The seeds are edible, and the shoots, stalks, and leaves can be eaten as greens (leafy vegetables). However, it is also used as digestive remedy and being taken to settle colic and stomach pains.

Table 2. (Cont'd).

Chenopodium murale L.	Chenopodiaceae	It was cultivated as a bread plant by British and Indians, because of its highly nutritive seeds. It is rich in vitamin C, used as a salad plant and in medicine. It is one of the most common weeds, becomes poison when accumulate nitrate.
Chenopodium vulvaria L.	Chenopodiaceae	Antispasmodic and emmenagogue. Cure barrenness. An infusion as a remedy for menstrual obstructions. It is also sometimes used as a fomentation and injection, but is falling out of use because of its unpleasant odour and taste. The infusion in nervous debility and colic. Used to expel worms from the bowel and for the fungal infections, as a cardiac stimulant and for acute gout. An infusion in the treatment of hysteria and nervous troubles connected with women's ailments. Seed oil is used for rheumatism, eczema and bites. It is a weed, becomes poisonous when accumulate nitrate.
Salicornia europaea L.	Chenopodiaceae	Diuretic and depurative; antiscorbutic and rich in minerals. The herb is edible, makes a pleasant seasoning when pickled in vinegar. A natural carminative, a treatment for obesity, rich in vitamin C and aid digestion, relieves flatulence and thought to help kidney complaints. It is considered as one of the most promising halophytes for domestic cultivation for cattles.
Salsola vermiculata L.	Chenopodiaceae	Heart stimulant, for asthma and salsolidine as an antihypertension and a vasodilator, a forage plant.
Seidlitzia rosmarinus Bge. Ex Boiss.	Chenopodiaceae	A soap substitute and is traded for grains. The leaves, stems and seeds are used as fodder for livestock. Ash makes a salt rich in sodium carbonate, when dissolved in water produces a soda. The dried leaves powder is detergent for washing cloths and dishes. It has also many industrial applications such as dyeing, pottery and ceramics. As a common fodder in dry and desert regions (Hadi, 2009).
Suaeda aegyptiaca (Hasselq.) Zoh.	Chenopodiaceae	Antibacterial, antioxidant activities. For tooth and gum infections. Snuff for dizziness, headaches, hysteria, nausea, nervous system, vision. A forage species. Very common
Suaeda asphaltica (Boiss) Boiss.	Chenopodiaceae	Antioxidant. Ashes as a source for sodium carbonate used in glass-making. Common forage.
Suaeda palaestina Eig et Zoh.	Chenopodiaceae	Posses' antioxidant activities. Burned and the ashes processed as a source for sodium carbonate for use in glass-making. A forage species. Very common.
Suaeda vera Forssk ex J.F.Gmel	Chenopodiaceae	Antioxidant activities, burned and the ashes processed as a source for sodium carbonate for use in glass-making. A common forage species.
Traganum nudatum Del	Chenopodiaceae	Antibacterial, to cure some diseases such as diarrhoea, rheumatism and healing wounds.
Anthemis cotula L.	Compositae	Antispasmodic, induce menstruation. Traditionally used to treat supposedly hysterical conditions related to the uterus. Astringent, diaphoretic, diuretic, emetic, emmenagogue and tonic. Infusion to treat rheumatism, epilepsy, asthma, colds and fevers. Externally, as a poultice on piles or to draw splinters out of the body. The leaves are rubbed onto insect stings. Some people are allergic to the plant and this remedy could give them painful blisters. It is contraindicated for pregnant or nursing mothers. A wild flower, important for honey bees.
Aster jabulatus L.	Compositae	Decoction of roots as a wash for headaches. Mashed roots for toothache. A wild flower.
Aster tripolium L.	Compositae	Decoction of roots as a wash for headaches and for toothache remedy. A wild flower.
Asteriscus graveolens (Forssk) Less.	Compositae	Antifungal agent against *Fusarium oxysporum f. sp. Albedini*. A wild flower.
Asteriscus pygmaeus (DC.) Coss & Dur.	Compositae	Anti-sterility and emmenagogue. A wild flower.
Carduus argentatus L.	Compositae	Antibacterial. It protects the liver and increases milk production in animals. A wild flower.
Carduus pycnocephalus L.	Compositae	Antibacterial agents. A wild flower and common weed.
Carthamus tenuis (Boiss. Et Bl.) Bornm.	Compositae	Fleshy leaf petioles and young stems are edible. Wild flower, source of allelochemicals. A common weed.
Carthamus tinctorius L.	Compositae	Aphrodisiac, conjunctivitis, ophthalmic, sedative, laxative and stimulant. The flowers are used in measles, fevers, and eruptive skin problems. Tea is used in colds and cough. Oil is used to lower cholesterol level. The plant is used as food additives, food (oil/fat) and fodder, A common weed. Ornamental plant,
Carthamus nitidus Boiss	Compositae	Kidney diseases. Weed.
Centaurea calcitrapa L.	Compositae	Bitter, astringent, appetizer, vulnerary, antiophthalmic, stomachic, intermittent fever and eye diseases. Leaves are used for cephalalgia. Roots and fruits are diuretic. Seeds vulnerary, febrifuge, for renal stones and pains. A common weed.
Centaurea iberica Trev. Ex Spreng.	Compositae	In folk medicine for different ailments. Fleshy leaf petioles and young stems are edible. Stimulates the salivary gland, stomach and intestinal gland, thereby relieving constipation, gas and promoting proper digestion and used for diabetes. A wild flower and common weed.
Centaurea pallescens Del.	Compositae	The powdered seeds as a remedy for stone. The powdered root is said to be a cure for fistula and gravel. A wild flower and common weed.
Centaurea sinaica DC.	Compositae	Stimulates the activity of the salivary gland, stomach and intestinal gland, thereby relieving constipation, gas and promoting proper digestion. Wild flower and common weed.
Chrysanthemum coronarium L.	Compositae	The leaves are expectorant and stomachic. The plant is used for burns, muscle ache, with black pepper to treat gonorrhea. Flowers are aromatic, bitter and stomachic, used as substitute for chamomile. The bark is purgative used in the treatment of syphilis. Wild flower.

Table 2. (Cont'd).

Chrysanthemum segetum L.	Compositae	Diuretic, stomachic and vermifuge. As a treatment for night sweats, fever, spasms, contusions, wounds, simple sores, ulcers, chronic vomiting, supportive discharges and draining, burns, and all breaches of the skin surface. Leaves may be edible when cooked; however, extreme caution is advised, because of the plant's potential toxicity. Wild flower.
Cichorium itybus L.	Compositae	Aperitif, stomachic, tonic, hypoglycemic, mild diuretic and laxative. Decoction for liver disorders, gallstones and kidney stones and for inflammations of the urinary tract. Alexiteric, digestive and emmenagogue, asthma, cancer, dysmenorrhea, impotence, insomnia, splenitis and tachycardia, stomachic. Effective in disorders of the kidney, liver, urinary canal and spleen. Adds to coffee or alone as a coffee substitute. Edible plant in fresh form or cooked as vegetable.
Conyza bonariensis (L.) Cronquist	Compositae	Anodyne, arthritis, gonorrhea, myalgia, ulcers, diuretic, healing and refreshing, It is also febrifuge, anthelmintic, and of insecticidal properties, anti-rheumatic, anti diarrheal, liver protector against venereal and urinary tract infections. External: Leaves poultice as a wound disinfectant, against the hemorrhoids, vermifuge. Steam of boiled plant in water is used for sweat lodges or burned to create a smoke that warded off insects and as a snuff to stimulate sneezing. Infusion of the plant to treat gastro-intestinal problems such as diarrhoea and dysentery and applied externally to treat bleeding piles and painful menstruation. A weed.
Cynara syriaca Boiss	Compositae	Diabetes. Blanched leaf stalks eaten as vegetable; dry immature flower heads to curdle milk to make a rennetless cheese. Stem is edible.
Echinops ritro L.	Compositae	The root is anti-inflammatory, galactogogue. It is used in the treatment of breast abscesses with inflammation, mastitis, lack of milk in nursing mothers and distension of the breast. A wild flower.
Echinops spinosissimus Turra	Compositae	Colds, kidney stones and diabetes. The root is anti-inflammatory and galactogogue. Treatment of breast abscesses with inflammation, mastitis, lack of milk in nursing mothers and distension of the breast. A wild flower.
Erigeron crispus Pourr	Compositae	Slightly tonic, diuretic and astringent. The infusion in diarrhea, gravel, diabetes, dropsically affections, dysuria of children, painful micturition, and in much nephritic affection. It is extremely useful for the arrest of capillary bleeding from any organ liable to hemorrhage, and to arrest profuse watery secretions from the gastro-intestinal and renal tracts. It has been a popular favorite for the choleric stage of cholera infantum. A snuff of the powdered leaves has successfully checked epitasis; while in bronchial disorders with bloody expectoration, syrup is effective. The same may be used to allay the cough and lessen expectoration in pulmonary consumption. An infusion is useful in leucorrhoea. It has proven of value in hyper-urination, and simple diabetes. The infusion is very helpful in hemorrhages from the stomach, bowels, bladder, and kidneys. It is useful in metrorhagia when not due to retained fragments of placenta, or other foreign bodies. The volatile oil as an astringent, and may be used for hemorrhoids, bleeding from small wounds, rheumatism, boils, tumors, sore throat, and tonsilitis. It is useful in dysentery, hemoptysis, hematemesis, and hematuria; a powerful remedy in menorrhagia. The oil may be given in the profuse stage of gonorrhea. A wild flower, weed.
Gundelia tournefortii L.	Compositae	Young inflorescence used as a vegetable. Decoction of roots is laxative, emollient and antidiabetic. In addition, used in bile, liver diseases and diarrhoea.
Inula viscosa (L.) Ait.	Compositae	Eye infection, muscle relaxation and infertility, open wounds, hemorrhoids, kidney stones, muscle aches, bone fractures, tonic, local paralysis, fever and headache. The drink "Resin" added to honey, is effective in alleviating rheumatism, colds, and act as an aphrodisiac. The application of fresh or dried powdered leaves on open or bleeding wounds or burns stop bleeding, and serves as an effective antiseptic and anti-inflammatory agent. Dried leaves powder mixed with oil and applied externally to affected parts of the body. Arthritis, bronchitis, mucus in the respiratory tract and respiratory infections. High blood pressure and diabetes, microbial inhibitor. Since the plant has potential applications in the protection of food crops, in the protection of coatings against mold and mildew, protection of humans against growth dermatophytes and *Candida albicans* an anti-inflammatory, anti-oxidant and anti-ulcer agent. Extracts of *Inula viscosa* possess a high content of bioflavonoids, a powerful antioxidant tomentosin (sesquiterpenic lactones), a powerful antiseptic, microbial and fungi inhibitor; saponins, a naturally-occurring foamy substance known to possess anti-cancer effects; Sterols, a cholesterol-lowering group of naturally-occurring chemicals.
Lactuca serriola L.	Compositae	The milky sap contains "lactucarium", which is of anodyne, antispasmodic, digestive, diuretic, hypnotic, narcotic, emollient and sedative properties. It is taken internally to treat insomnia, anxiety, neuroses, hyperactivity in children, dry coughs, whooping cough and rheumatic pain. An infusion of the fresh or dried flowering plant can also be used. The fixed oil from the seeds is said to possess antipyretic and hypnotic properties. A homeopathic remedy is made from the plant. It is used in the treatment of chronic catarrh, coughs, swollen liver, flatulence and ailments of the urinary tract. The plant should be used with caution; Even normal doses can cause drowsiness whilst excess cause's restlessness and overdoses can cause death through cardiac paralysis.

Table 2. (Cont'd).

Lactuca virosa L.	Compositae	The effects of ingesting *L. virosa* are similar to opium, although no opiates are present in the plant. Latex, a simple preparation in a manner resembling opium, which is called lactucarium. One of the active compounds, lactucin, is an adenosine receptor agonist, while another, lactucopicrin, has been shown to act as an acetylcholinesterase inhibitor. The plant has been used as an anesthetic and a sleep aid, as well as recreationally. Plant oils and extracts are often added to tea to help induce sleep. While its use as a galactagogue has been reported, Many add the greens to salads, though the leaves are more bitter than other salad greens. Smoking of dried leaves or a sticky precipitate extracted from the leaves. The plant contains flavonoids, which have strong anti-oxidant properties.
Launaea nudicaulis (L.) Hooker fil.	Compositae	Milky material is taken during constipation. Leaves are used to relieve fever, posses' antibacterial and antifungal activities. A weedy species.
Launaea spinosa (Forssk) Schultz. Bip.	Compositae	Antibacterial, antidiarrhoic and antispasmodic, used for colic and intestinal diseases.
Matricaria aurea (Loefl.) Schultz. Bip.	Compositae	Colic, cramps, stomachache, snake bites, fever, coughing and heart diseases. It is prepared and consumed. A wild flower and weed.
Notobasis syriaca (L.) Cass.	Compositae	Headaches, plague, canker sores, vertigo and jaundice. Sometimes as a galactogogue to promote lactation. It is also a component in some bitters formulas and an antioxidant. Fresh **s**tem and leaf base are edible. It is a common weed.
Onopordon anisacanthum Boiss	Compositae	Demulcent, the flowering plant is cardiotonic. It is used in some proprietary heart medicines. The juice of the plant is good in the treatment of cancers and ulcers. A decoction of the root is astringent. It is used to diminish discharges from mucous membranes. A wild flower.
Onopordon macrocephalum Eig	Compositae	A decoction applied to a bold head would restore growth of hair. Antiseptic, bleeding, to treat a sore throat, reduces mucus discharge, astringent, wounds and demulcent. A wild flower.
Pallenis spinosa (L) Cass.	Compositae	Contain sesquiterpenoids, leaves for eczema, roots are anti-rheumatism, muscular contraction, tire, vomiting for the new one born, diabetes, headaches, and disinfecting. A wild flower.
Phagnalon rupestre (L.) DC.	Compositae	Headache, burns, asthma and as an analgesic for toothache. A wild flower.
Pluchea dioscoridis (L.) DC.	Compositae	Rheumatic pains. The decoction of fresh leaves for epilepsy in children, colic, and as carminative and remedy for cold. The aromatic leaves to perfume ladies' hair plaits. A decoction of root bark against sterility in women and impotence in men, a decoction of the root to treat colds, the roots and leaves are stimulant, comforting medicine and the decoction is used for curing children and infantile ailments.
Pulicaria undulate (L) Kostel	Compositae	Aromatic, added to the tea for good refreshing flavor. A carminative and stimulant.
Pulicaria arabica L. (Cass)	Compositae	The bruised leaves have a soap-like smell. Leaves and roots are astringents and can be used in the treatment of dysentery. A paste of the plant is applied externally to wounds**.** The aerial parts of the plant are used as an antidiarrhoeal agent and as a flavoring agent. It is a wild flower.
Pulicaria crispa (Forssk.) Oliver	Compositae	Tonic, digestion (stimulant), dysmenorrhea, epilepsy, lactagogue, vermifuge, diarrhea, kidney diseases, scorpion bite and as an aroma and a flavoring agent. It is a wild flower.
Pulicaria desertorum DC	Compositae	Intestinal colic, insect repellant, antialgetic, insecticidal and antibacterial properties. The aerial parts are an antidiarrhoeal agent. The leaves as an infusion, or dried as a poultice, to be taken internally and used externally. In folk medicine, head colds, neuralgia, respiratory problems and sinusitis. Sap of the fresh leaves as nose drops to relieve the sinuses. Poultices are applied for headaches. For children, as an infusion and good for diabetes. It is sometimes added to tea or Bedouins sometimes drink it instead of tea.. An infusion of the leaves is used for heart diseases and is considered as a carminative and stimulant. A flavoring agent and wild flower.
Scolymus maculatus L.	Compositae	Stem decoction for intestine and kidney inflammation. Leaves and roots are edible. Young leaves used as spinach. They are eaten as a salad. Considered as a wild flower.
Scorzonera papposa DC.	Compositae	Snake bites. Stem and leaf base are edible.
Silybum marianum (L.) Gaertn.	Compositae	Anti-oxidant, anti-inflammatory, contains some important chemicals including silibinin, silymarin which is believed to be beneficial in toning liver and increase its resistance to infections. It is widely recommended for jaundice, hepatitis B and C., spleen and kidney disorders, cervical cancer, breast and prostate cancer, and to decrease side-effects of some medications. It was also used to increase milk flow in nursing mothers and as a tonic for breasts. In herbalism, it is used in cases of liver diseases (cirrhosis, poisoning, infertility and sexual weakness), gallbladder disease. Silibinin is an antihepatotoxic, radical-scavenging agent, thus stabilizing and protecting the membrane lipids of the hepatocytes (liver cells). Silidianin is a plant growth regulator. Active against liver cancer cells *in vitro*. Its potent extract is used in medicine under the name silymarin. Silibinin is used against poisoning by amanitas, such as the Death Cap (*Amanita phalloides*) as well as in cerebral edema and acute hepatitis therapy. Seeds are also antioxidants. *Silybum marianum* extract has antifungal effects, preventing the growth of dermatophyte more than saprophyte fungi. Milk thistle may be as effective as fluoxetine in treatment of obsessive-compulsive disorder. It is edible.

Table 2. (Cont'd).

Sonchus maritimus L.	Compositae	For bronchial infections with yellow phlegm, tonsillitis, sore throat and in small doses as a bitter tonic for the spleen deficient patient with a sluggish liver. It is used as dandelion. A wild flower.
Sonchus oleraceus L.	Compositae	Coolant, diuretic, laxative and general tonic. Abortifacient anticancer, antidiarrhoeal, anti-inflammatory, blood purifier, calms the nerves, cathartic, clears infections, cure for opium addiction, digestive purgative, emmenagogue, emollient, febrifuge, gynecological aid, heart medicine, hepatic, hydrogogue, lactogogue, narcotic pectoral, pediatric aid, poison, poultice, refrigerant, sedative, stop bleeding, to prevent infection, tonic, toothache remedy, insecticide and vermicide. The brownish gum left after the evaporation of the juice is a powerful hydragogue. Leaves are edible and cooked or eaten raw in salads.
Tragopogon collinus DC.	Compositae	Intestinal colic, young roots are good for the stomach, convalescents, and for giving strength to the thin and the consumptive. Young leaves eaten raw as an antiscorbutic. Extracted white juice when coagulated is chewed to keep the mouth moist. Young roots can be scrapped, cut and used in salads. It is a wild flower.
Varthemia iphionoides Boiss. Et Bl.	Compositae	Nerve system (tremors), heart diseases, stomach and intestine gas, pain and inflammations, eye ailments, antifungal, abdominal pains, edema, rheumatism and wounds. Aromatic and a wild flower.
Xanthium spinosum L.	Compositae	Small pox, anti-cancer, sedative and diaphoretic. Both *Xanthium* species are useful for dysenteric treatments. The plant is febrifuge. It is a wild flower and weedy species.
Xanthium strumarium L.	Compositae	Small pox, cancer, sedative and diaphoretic. Fruits as tonic, cooling, demulcent, in chronic malaria and urinary diseases. The herb is used in snake bite. The pollen causes asthma in sensitive persons. Wild flower and common weed.
Convolvulus arvensis L.	Convolvulaceae	Skin burns, anti-hemorrhagic, cuts and wounds. Leaves tea as a wash on spider bites and ingested to reduce profuse menstruation, of flower to reduce fever and heal wound and of roots as laxative. Roots have strong emetic effects. Also given to children for removal of warm from intestine. It is appropriate in skin disorders. Fodder, wild flower and weed.
Alyssum sp.	Cruciferae	Rabies, madwort, heal bite, calming anger, asthma, nervous disorders, diuretic and a source of vitamin C. Leaves and flowers in salads for extra spiciness. However, some people with very sensitive skin get a rash from handling this plant. It is a wild flower.
Cardaria draba (L.) Desv.	Cruciferae	The plant is antiscorbutic. The seeds as a cure for flatulence and fish poison. The plant is edible at early stage but strong better tastes at flowering. Seeds are used in spices. A common weed.
Diplotaxis erucoides (L.) DC.	Cruciferae	Leaves used raw or cooked, have a mustard-like flavor and thus can be added to salads. This species has irritant properties. It yields principally sinigrin. Weed and allellopathic plant.
Eruca sativa Mill	Cruciferae	For digestive problems, support in lymphatic conditions, and scrofula (tuberculosis of bones or the lymphatic system), in case of sexual weakness and hair loss. As a plaster to draw out poison, including scorpion venom. Seeds are stomachic and a remedy for insanity. An edible in salads.
Erucaria hispanica (L.) Druce	Cruciferae	A pot herb and salad plant. A weed species.
Nastartium officinale R.Br.	Cruciferae	Stomachic, appetizer for digestive and gall bladder disorders, coughs and asthma. It is a useful addition to the diet in winter and can be eaten raw in salads or used to flavor soups. It is rich in iodine. An edible species as a kitchen herb and in salads as a spice.
Sinapis alba L.	Cruciferae	Seeds are analgesic, carminative, expectorant and stimulant. Traditionally, used in digestive complaints. An infusion of the seeds is useful in treatment of chronic bronchitis, rheumatism, muscular and skeletal pains (it stimulates circulation in the pain area). Externally as plasters, poultices or added to the bath water. It can also be used for skin eruptions. Mustard tea is used for fevers and colds. An edible plant as a kitchen herb and in salads as a spice.
Sinapis arvensis L.	Cruciferae	Laxative (whole seeds) and rubefacient (powdered). It is less active than *Sinapis alba* that extensively cultivated and used to prepare French table mustard. An edible kitchen herb and in salads as a spice.
Sisymbrium irio L.	Cruciferae	Coughs and chest congestion, rheumatism, detoxify the liver and spleen, reduce swelling and clean wounds. The Bedouin use the leaf as a tobacco substitute. The seeds are expectorant, ophthalmic, restorative and stimulant and in treatment of asthma. Externally, as a stimulating poultice. The seeds placed under the lids of sore eyes to cause weeping and thereby wash foreign matter. Leaves infusion in treating affections of the throat and chest. Edible as a salad plant and a kitchen spicy, hot when macerated and fermented in yoghurt. It is a common weed.
Sisymbrium officinalis (L.) Scop.	Cruciferae	Cardiac tonic, febrifuge, antitussive and expectorant. Edible as a salad plant and a kitchen spicy fermented hot herb in yoghurt. It is a common weed.
Bryonia dioica Jacq.	Cucurbitaceae	A drastic purgative, emetic and abortive. Extract is a powerful repulsive, anti-arthritic, anti-rheumatic and anti-ecchymotic. A climber species with poison fruits.

Table 2. (Cont'd).

Citrullus colocynthis (L.) Sch.	Cucurbitaceae	Cancer, constipation, fever, neuralgia, rheumatism, sciatica, splenomegaly, worms, wounds, cathartic, diuretic, emetic, expectorant and diabetes. The ground was luxuriant with colocynth. Food plant for horses, cups for milk, or lotion for tired (swollen) feet. Roots and fruits powder used to cure gastric troubles and with sugar to cure jaundice. Boiling water of fruit powder inhaler to cure toothache. Used as an insecticide. Suppositories made from pulp are effectual for sick languishing of robust persons. Roots are mashed with some pulp and mixed with goats' milk and then used as a purge to treat colic. Seeds were claimed as a cure for diabetes. Small amount of juice as a drastic purge. Fresh leaves are placed on the site of scorpion stings and insect bites to relieve pain and itching. Crushed seeds in a poultice for tumors and fistulae. Plant diluted with other ingredient for use as a purge. Crushed pulp blended with oil as a salve for joint pain. Fruits are poisonous and cause unconsciousness if eaten and may lead to death.
Cucumis prophetarum L.	Cucurbitaceae	Fruits to treat eczema, emetic, purgative, toxic and for pregnancy abortion. The plant is a genetic source in breeding. A wild flower.
Cuscuta campestris Yuncker	Cuscutaceae	Plant extracts as good cancer inhibitor to cure breast and skin cancers. The petroleum ether extract may be useful in treatment of androgen induced alopecia by inhibiting the enzyme 5-alpha-reductase. Seeds for the treatment of osteoporosis in some Asian countries, the effect may be due to kaempferol and hyperoside compounds. A parasitic noxious weed.
Cyperus alopecuroides Rottb.	Cyperaceae	Pectoral emollient, analgesic and anthelmintic. Tubers sold in the drug market. Tubers posses a nice odor, hence used for perfuming hair ribbons by women in certain countries. An industrial species.
Cyperus conglomeratus Rottb.	Cyperaceae	Used in food, medicine, fiber and shelter. The dead and partially decaying shoots in treating pregnant women. The pith for widening and drying of fistula. The ash for certain eye diseases. Ash macerated in vinegar heals wounds. Used to cure cancer. Sedges are used throughout the tropics for basketry, mat weaving, thatching, fencing, pot pourri and perfumery, paintings and bookmarks. A weedy species.
Cyperus laevigatus L.	Cyperaceae	Toothache. Stalks crushed into fine particles, mixed with water and clay and taken for penis burning disease. Stalk powder is used for deep cuts, boils, skin ulcers and other skin diseases and as a snuff for hard head colds. The plant is used as strengthener venereal aid; flower and stalk ashes and kukui nut (*Aleurites moluccana*) juice mixed and rubbed on the tongue for general debility. Dermatological aid. The leaves are used to weave very fine mats and hats, flexible bed or floor coverings, and skirts. Stem fibers used to remove all impurities in liquids and also woven into strings and ropes. An industrial species.
Cyperus longus L.	Cyperaceae	Astringent, diaphoretic, gastric and intestinal ulceration. An industrial species.
Cyperus rotundus L.	Cyperaceae	Anthelmintic, diuretic, febrifuge and galactagogue. Used also for earache, bee stings, bites, dysmenorrheal, stomachic and analgesic. The rhizome gives positive result in the treatment of menstruation, vomiting and diarrhea. Also used as a laxative for cattle. For treating nausea, for fever, inflammation, for muscle relaxation and many other disorders. Tubers made into meal and cooked as cereal. A wild flower and common weed..
Scabiosa argentea L.	Dipsaceae	Used in scabies, as diuretic and wound healing. A wild flower and weed species.
Scabiosa aucheri Boiss.	Dipsaceae	Scabies, as diuretic and wound healing. A wild flower and weed species.
Ephedra alata Decne	Ephedraceae	Astringent, asthma, cardiac stimulant, hay fever, common cold and many other complaints of the respiratory system. Naturally occurring isomer pseudo ephedrine-appears is a contact sensitizer. However, recently *Ephedra*-derived products have been found hazardous and may cause cardiac dysfunction and even death when excessively used. A forage species.
Ephedra alte C.A. Mey.	Ephedraceae	Ephedrine for asthma and many other complaints of the respiratory system. A forage species.
Chrozophora tinctoria (L.) A. Juss.	Euphorbiaceae	Cathartic and emetic. Cleaning the bowels, promoting evacuations by stool and purgative, febrifuge, fever and warts. The leaves juice for chest burning and stomachic. A common weed
Euphorbia helioscopea L.	Euphorbiaceae	Antiperiodic and febrifuge. The root is anthelmintic, puragative, toxic and vesicatory. Leaves and stems are vermifuge and leaves for fever. The plant is cathartic and anticancer. The milky sap is applied externally to skin eruptions. The seeds against cholera and can be mixed with roasted pepper, Latex cause irritation and inflammation to mucous membrane and toxic to mammals and fish. A wild flower and common weed.
Euphorbia macroclada Boiss	Euphorbiaceae	Warts, constipation, eczema, female sterility, melliferous, colds and purgative. Antibacterial, antiscorbutic, aphrodisiac, diuretic, rubefacient and stimulant. Latex cause irritation and inflammation. A wild flower and common weed.
Euphorbia petiolata Banks et. Sol.	Euphorbiaceae	Skin diseases, migraine, intestinal parasites and as wart cures. Antiproliferative, cytotoxic, antimicrobial and anti-inflammatory, anticancer and antioxidant activities. This species is traditionally used to treat dermatitis and fungal infections. Latex cause irritation and inflammation. A wild flower and weed species,
Euphorbia prostrata Ait.	Euphorbiaceae	Anti-inflammatory and antibacterial. Latex causes irritation and inflammation. Wild flower and weed species.

Table 2. (Cont'd).

Mercurialis annua L.	Euphorbiaceae	Cancer and skin diseases, purgative, diuretic or antisyphilitic, **e**metic, emollient, homeopathy, ophthalmic, and for warts. Externally to treat women's complaints, ear and eye problems and sores. It is used in the treatment of rheumatism, dropsy, diarrhoea and disorders of the gall bladder and liver. Wild flower and poison weed.
Ricinus communis L.	Euphorbiaceae	Analgesic, laxative, purgative, blisters, constipation, halitosis, ophthalmia, toothache, ulcers, lubricant, and illuminant. The seed oil is used in paint and soap products, as a medicine and for ornament. Oil is laxative to treat constipation and has an anthelmintic action. Two seeds if consumed can cause death. Leaves were used to lengthen hair, in a remedy for epilepsy and in clysters. Oil as an illuminant, in industry as a lubricant, in tanning and a leather preservative. Leaves are used as pain killer in bone strike and are also useful against bronchial pneumonia. The oil-cake is used as a fertilizer and fuel.
Quercus infectoria Oliv.	Fagaceae	The bark is dried and used in medical preparations, it is rich in tannin, and roasted fruits are edible. Forest tree.
Erodium cruciatum L.	Geraniaceae	Stop bleeding and uterine hemorrhage. Wild flower and weed species.
Aegilops umbellulata Zhuk	Gramineae	A very beneficial in breeding, improved crops with new characteristics, particularly relating to disease resistance. Highly tolerant to salt.
Aeluropus lagopoides (L.) Trin.	Gramineae	Source of resistance genes to leaf rust, stripe rust, and powdery mildew
Aristida plumosa L.	Gramineae	Feed for livestock, used as turf, fuel, human nutrition and medicine. A forage species.
Arundo donax L	Gramineae	The root is diaphoretic, diuretic, emollient and galactofuge. An infusion stimulates menstrual discharge and diminishes milk flow. A paste of the root to treat headaches. Isolated alkaloids raise blood pressure and contract the intestine and uterus. The rhizome or root stock to treat dropsy. The plant contains the alkaloid gramines a vasopressor, raising the blood pressure at small doses, causing a fall in larger doses. The stems have been used as splints for broken limbs. Rhizome is decocted and used for cancer; species of *Arundo* are also used for condylomata and indurations of the breast. The root infusion is regarded as antigalactagogue, depurative, hypotensive, sudorific and for hair treatment. An Ornamental species.
Avena sterilis L.	Gramineae	Mild depression, insomnia caused by over-fatigue, lethargy and convalescence from debilitating conditions. Relaxes the nervous system, abscess, cholesterol in blood vessels, freckles, gout, gargle, cough, eczema, haemolytic, enema, liver disease, lung disease, complaints of the stomach, gastric catarrh, disease of the spleen, nerve tonic, compress, arthritis, light diet in case of stomach problems, suffer from stone, laryngitis, refreshing and gentle diuretic. A forage and weed species.
Cynodon dactylon (L.) Pers.	Gramineae	Astringent, piles, venereal diseases, colds and diuretic. Seeds are used in folk medicine as anti-cough. The plant is cooling, haemostatic, tonic. Macerated fresh leaves stop bleeding or for wound healing. Its juice is mixed with milk for curing bleeding piles, irritation of urinary tract and for vomiting. Sometime it is used with rose-flower in treatment of jaundice, piles and dysentery. A forage and lawn plant. A common weed.
Dactylis glomerata L.	Gramineae	Oestrogenic. The plant is a folk remedy for treating tumors, kidney and bladder ailments. A forage species.
Desmostachya bipinnata (L) Stapf.	Gramineae	Used in folk medicine to treat dysentery, it is diuretic and useful in amenorrhoea and kidney disease. It is used for diarrhoea, jaundice, skin diseases, burning sensation and excessive perspiration. Forage and an ornamental plant.
Digitaria sanquinalis (L.) Scop.	Gramineae	Emetic and ophthalmic. A decoction of the plant is used to treat gonorrhea. A folk remedy for cataracts and debility, it is also emetic. A forage species.
Echinochloa colonum (L.) Link	Gramineae	Diuretic and styptic. A forage and weed species.
Echinochloa sp.	Gramineae	Styptic and for spleen disorders. A forage and weed species.
Imperata cylindrica (L.) Beauv.	Gramineae	Anthelmintic, antibacterial, antivinous, astringent, anticancer, diuretic, emollie-nt, febrifuge, restorative, styptic, tonic and anti-rheumatc. Flowers are used for hemorrhages and wounds. They are decocted to treat urinary tract infections, fevers and thirst. The root is antifebrile, antivinous and restorative. It is used in the treatment of nose bleeds, haematuria, haematemesis, edema and jaundice. The root has antibacterial action against *Staphylococcus aureus* and *Bacillus dysenteriae*. A decoction of the root is used as an anthelmintic and also to treat digestive disorders, diarrhoea and dysentery. Extracts of the plant have shown viricidal and anticancer activity. It is used for thatching the roofs of traditional homes throughout south-east Asia. Leaves are woven to make mats, bags and raincoats. The inflorescences are valued for stuffing pillows and cushions, in land reclamation and for soil erosion control. The stems and leaves for making ropes, and its fibres to make paper. Flowers, leaves and roots are edible. An ornamental and aquatic weed.
Lolium temulentum L.	Gramineae	The spirit is astringent, and may excite vomiting. Digesting bruised and coarsely powdered grains in rectified spirit. Headache, rheumatic meningitis, and sciatica. Giddiness and epistaxis. The seed is anodyne and sedative, however, a fungus that is often found on the seed that has the medicinal properties. A poison weed.

Table 2. (Cont'd).

Phragmites communis Trinius	Gramineae	Roots and leaves are diaphoretic, diuretic, emetic, stomachic and sudorific. The roots and sprouts are cooling. Rhizome is used for cancer. In folk medicine, for condylomata, indurated breast, breast cancer and leukemia. Used for abscesses, arthritis, bronchitis, cough, cholera, gout fever, hiccups and rheumatism. Ash of leaves used for foul sores. Decoction of flowers for cholera and food poisoning. Stems are used to establish cottages and small homes, manufacturing chairs, baskets and seats, certain traditional music tools. Young shoots may be eaten raw or cooked. Unfolded leaves used as potherb. Grounded dry young leaves, mixed with cereal flour in making dumplings. Mixed with gypsum for halitosis and toothache. The hardy stems are used as firewood and roofing ribs. Culms used for pen handles. Makes first-class paper, but difficult to bleach. An industrial species. Common in water and along water ways.
Polypogon monspeliensis (L.) Desf.	Gramineae	An infusion of the plant ashes has been used in the treatment of heart palpitations. Common.
Sorghum halepense (L) Pers.	Gramineae	Used as fodder for cattle but in dry places it becomes tough and dangerous to animals and most of cattle become died after eating it. It is also used for fuel purposes in houses.
Juncus acutus L.	Juncaceae	Oil, fiber and timber plant. The stems are used in making woven baskets, thatching, weaving mats, while it possess an anti-eczematic activity and as stomachic. Seeds are rich in fatty acids and possibly can be used as potential oil sources for different purposes. An ornamental and industrial species. Common species in water and marshes.
Juncus maritimus Lam.	Juncaceae	Oil, fiber and timber plant. Leaves are used for primitive manufacture of baskets, net of wooden large sieves, mats, and culms used as raw materials for paper industry. Leaves for decoration with other species of *Typha*. An ornamental and industrial species. Common in marshes.
Lavandula dentate L.	Labiatae	Relaxes the body. Excellent when combined with herbs that have a strong taste. Aromatic plant.
Marrubium vulgare L.	Labiatae	Abscesses, antiseptic, for colds, diabetes, earache, fever, stomachache, expectorant, mild sedative, cholagogic, antispasmodic, and emmenagogic properties. In herbalism, it is used in an infusion for respiratory complaints, asthma, bronchitis, and for liver and gall bladder disorders. Externally, it is used to treat inflamed wounds. Tea used to relieve coughs. A wild flower.
Mentha aquatica L.	Labiatae	A much-preferred aromatic. A tea relieves headaches, menstrual cramps, indigestion, rheumatic pains, stomachache and abdominal ache. An aromatic species.
Mentha longifolia (L.) Hudson	Labiatae	Dyspnea, chills, cough, fever and gastrosis. To treat digestive and gall bladders disorders, flatulence, diarrhoea and abdominal spasms. It is carminative, antiseptic and stimulant. An aromatic species.
Salvia aegyptiaca L.	Labiatae	Demulcent, diarrhoea, piles, colds, fever, stomach and intestinal pains. A wild flower.
Salvia splendens L.	Labiatae	Recreative and erotic. Control diabetes mellitus, antiseptic, antibacterial, antifungal, antiviral, anti-inflammatory, antioxidant, hypoglycemic, antispasmodic, cytotoxic, and antitumor activities. A wild flower.
Salvia syriaca L.	Labiatae	Painful illnesses, it has an antinociceptive and anti-inflammatory effect on mice.
Teucrium polium L.	Labiatae	Febrifuge, hepatic, abscesses, abdominal pain, insect bites, jaundice and malarial fever. For diabetes, fever, gastric pains, vulnerary, kidney, liver diseases, stomach, intestine pain and inflammations. Leaves tea cure fevers, malaria and cholera. Dried leaves are smoked in a pipe to treat rheumatism and used as an insect repellant, protecting the leather portions of stored armor. The plant has an antioxidant activity. A wild flower.
Teucrium sp.	Labiatae	Diabetes, fever and stomach pain.
Teucrium spinosum L.	Labiatae	Anti-inflammation
Ballota nigra L.	Labiatae	Sedative, antispasmodic, restorative and aromatic. It contains phenylpropanoids as an antioxidants. The plant is an antiemetic, effective against nausea and vomiting especially when the cause residues in the nervous system, like motion sickness or morning sickness, but also in case of dyspepsia. This plant is believed to be expectorant, vermifuge, a menstrual normalizer and a remedy for gout and arthritis. It's an astringent for the skin. A wild flower.
Ballota undulata (Sieber ex Fresen) Bentham	Labiateae	It has hypolipidaemic properties, for skin diseases and cuts. By boiling the leaves in olive oil it is made into topical oil. The oil is rubbed and used until wounds are healed. A weedy species.
Alhagi maurorum Medik.	Leguminosae	As a remedy of human diseases in folk medicine. Laxative and purgative, and as anti-diarrhoea with blood. Analgesic, aphrodisiac, hepatic, cataracts, jaundice, migraine, rheumatism, diaphoretic, diuretic and expectorant. Grazed by camels. A common weed.
Lotus peregrinus L.	Leguminosae	Hypoglycemic, restorative and vermifuge. The flowers are antispasmodic, cardiotonic and sedative. The root is carminative, febrifuge and tonic. The plant is used externally as a local antiinflammatory compress in all cases of skin inflammation.
Ononis natrix L.	Leguminosae	Jaundice, stomachic, sedative, and treatment of palpitation of the aorta, haemostatic and ophthalmic collyrium in livestock. A wild flower.

Table 2. (Cont'd).

Ononis spinosa L.	Leguminosae	Diuretic and lithontripic. The roots, leaves and flowers are antitussive, and aperients. The root contains an anti-diuretic fixed oil and a diuretic essential oil. Root infusion is used in the treatment of dropsy, inflammation of the bladder and kidneys, rheumatism and chronic skin disorders. A cough mixture is made from the bark. A wild flower.
Onobrychis crista-galli (L.) Lam.	Leguminoseae	Fresh soft fruits are edible. A weedy species.
Allium sp.	Liliaceae	The whole plant is antiasthmatic, blood purifier, carminative, cathartic, diuretic, expectorant, hypotensive, stimulant and vasodilator. A tincture is used to prevent worms and colic in children, and also as a remedy for croup. The raw root to reduce blood pressure and also to ease shortness of breath. They contain sulphur compounds help reduce blood cholesterol levels, act as a tonic to the digestive system and also tonify the circulatory system. A wild flower.
Asparagus aphyllus L.	Liliaceae	Root is diuretic, antispasmodic and sedative. It reduces high blood pressure and heart beat. An ornamental species.
Asparagus acutifolius L.	Liliaceae	Diuretic and for gout, stomachache, dysentery and cooling. Crushed roots are tied on the body for any kind of swelling in human beings. The paste of the fasciculate root is applied externally in snakebite. Root is used to cure urinary disorders, discharges of blood in urine, and to treat headache due to sunstroke. An ornamental species.
Asparagus stipularis Forskal	Liliaceae	The plant is diuretic, for arrhythmia and other heart complaints. useful for bronchitis, respiratory infections, rheumatism and headache. Drug used to produce perspiration, to treat pain caused by venous swelling. A syrup or an extract cause copious dieresis, and are reputed very beneficial in repressing undue excitement of the circulatory system. Shoots may produce irritation of the urinary mucous surfaces with a morbid mucorrhoea. It is an ornamental species.
Asphodelus fistulosus L.	Liliaceae	Diuretic, laxative, for constipation, ulcers and dropsy. Seeds are eaten with yoghurt and applied externally to ulcer and inflamed organs while the fresh leaves as condiments. A weed species.
Ornithogalum umbellatum L.	Liliaceae	Poisonous, gout, rheumatism and cardiac problems. A wild flower.
Smilax aspera L.	Liliaceae	The root is alterative, demulcent, depurative, diaphoretic, diuretic, stimulant and tonic and as a body cleaner. Squeezed fruits applied to the skin for scabies. Roots relieve symptoms of rheumatism, gout and arthritis; diuretic and to enhance digestive functioning. Excellent in balancing both male and female hormones. Has the same effect on the body as the male hormone testosterone, and as an important hair growing hormone. An ornamental species.
Urginea maritima (L.) Barker	Liliaceae	Hemorrhoids, constipation, and a rodunticide source. Anti-rheumatic, analgesic, cardiotonic, cathartic, deobstruent, diuretic, emetic, emmenagogue and expectorant. The bulb for alopecia. Abscesses, calefacient, colds, jaundice, skin diseases and care. A poison wild flower..
Linum sp.	Linaceae	The oil is demulcent, laxative and used for burns and rheumatic pain. Used for arthritis, constipation, urinary disorders, venereal diseases and wounds. A wild flower.
Loranthus acaciea Zucc	Loranthaceae	Dried young twigs and leaves employed against epilepsy, convulsions, and giddiness. It was thought to lessen reflex irritability and provide a tonic for the heart. The berries, when chewed, provide immediate relief from stitches. A parasitic species.
Lythrum hyssopifolia L.	Lythraceae	Astringent, to treat diarrhoea and dysentery. A wild flower.
Lythrum salicaria L.	Lythraceae	Against internal bleeding, haemorrhoids and as an astringent. A wild flower.
Alcea acaulis (Cav.) Alef.	Malvaceae	Roots as anti- inflammation, indigestion, diarrhoea, earache and toothache. An ornamental.
Althea rosea (L.) Cav.	Malvaceae	Cough, abdominal inflammation, ulcer and asthma. May be an emollient and laxative. Stop bedwetting and as a mouthwash in cases of bleeding gums. The flowers are demulcent and diuretic. As a decoction to improve blood circulation, for constipation, dysmenorrhoea and hemorrhage. The root is astringent and demulcent and as a poultice to ulcers. Internally, as anti-dysentery. Roots and flowers are used in inflammations of the kidneys/womb, vaginal/seminal; they have a sweet, acrid taste and a neutral potency. Discharge and roots are used to treat loss of appetite. The seed is demulcent, diuretic and febrifuge. An ornamental.
Althea setosa L.	Malvaceae	Wounds. Leaves and roots as a vegetable; has been used to help gastritis.. Dried, powdered root used to make marshmallows. An ornamental species.
Malva nicaeensis All.	Malvaceae	Flower helps soothe inflammation in the mouth and demulcent. For fever, ulcers throat, cough, wounds and skin diseases. It is helpful for earaches, urinary inflammations, hemorrhoids and eye infections. Edible, it is a common weed and wild flower.
Malva sylvesris L.	Malvaceae	Anti-cough, toothache, gingival abscesses, stomachache and abdominal children pain. It is emollient, expectorant, anti-inflammatory and astringent. Tonic, coughs, laxative and intestinal mucosa. For colds, constipation, cough and gastrointestinal pains. Edible, a wild flower.
Acacia asak L.	Mimosaceae	Extracts of barks showed effective free radical scavenging activities. Stem cortex is used for gastric ulcer, and skin diseases. It is antiseptic and aromatic.
Acacia farnesiana Willd.	Mimosaceae	Bark and leaves extract to treat malaria, the roots and bark for diarrhoea and skin diseases. Leaves can be rubbed on the skin to treat skin diseases. It is an aromatic and industrial species.

Table 2. (Cont'd).

Acacia gerrardii Benth	Mimosaceae	For burns, fever, sore gums, loose teeth and toothache. An industrial species.
Acacia nilotica	Mimosaceae	Tonic and febrifuge. Bark is used for cough. Antidiarrhoea, astringent, antiseptic, demulcent, antidysentery, constipation, and leprosy. Thin twigs are chewed as a toothbrush, the bark or gum to treat cancers and/or tumors (of ear, eye or testicles) and indurations of liver and spleen, condylomas. Sap or bark, leaves, and young pods are astringent, chewed as an antiscorbutic. Leaves poultice for ulcers. The resin with orange-flower infusion for typhoid convalescence. Powder to dry out second degree burns, for lesions and dentifrices, gum, cough and eye medications, strengthen eyelashes and eye muscles. Seeds in tanneries and diarrhoea. Gum is an astringent. Internally for ulcers and spitting of blood and externally in collyria. An industrial species.
Prosopis farcta (Banks et. Sol.) Macbride	Mimosaceae	In folk medicine as astringent, anti-dysenteric and for hemorrhoids. For cardiac and chest pain, blood sugar lowering, diabetes, kidney stones and menstrual cramps. A common noxious weed.
Eucalyptus camaldulensis Dehn	Myrtaceae	Skin disorders and female disorders such as cramps, hot flashes and heavy bleeding. Especially effective against atopic diseases such as eczema and hyperactivity. Source of allelochemicals.
Nitraria retusa (Forsk) Aschers	Nitrariaceae	Plant ashes have the ability to remove fluids of infected wounds, a decoction of fresh leaves used in case of poisoning, upset stomach, ulcers, gastritis, enteritis, heartburn, colitis and colonic abdominal pain. Fruits are edible and useful in the treatment of urinary tracts. Ihis species is widely used by the Bedouins as a source of fuel. It promote cell population growth of human cancer cells by inducing apoptosis (Boubaker *et al.*, 2011). Its fleshy red fruits are eaten by locals and used to prepare drinks. The leaves serve as supplement for the tea and as poultice. Common in highly saline sites in the Jordan Valley.
Comicarpus africanus (Lour) Dandy	Nyctaginaceae	Root is used in treating jaundice. A wild flower.
Phoenix dactylifera (wild)	Palmae	Aphrodisiac, tonic, bruises and headache. Fruits are edible. It is an ornamental tree.
Glaucium corniculatum (L.) J. H. Rud	Papaveraceae	Stimulant, acrid, alterative, diuretic, diaphoretic, purgative, and vulnerary. As a drastic hydragogue, it is fully equal to gamboges. The juice cause skin inflammation, and even vesication, a caustic for the removal of warts; applied to indolent ulcers, fungus, useful in removing specks and opacities of the cornea, and curing ringworms. An alcoholic tincture of the root to prevent or subdue traumatic inflammations. Used for scrofula, and piles. Useful in hepatic affections, influence the spleen. It is a remedy influencing the parts supplied with nerve force from the branches of the solar plexus, and with blood from the hepatic artery, and to some extent by the splenic artery. Inflammation of the liver, when supportive action has not set in, is benefited by chelidonium. For migraine, bilious headaches, supraorbital neuralgia, bilious dyspepsia and other gastric and intestinal disturbances. It is a remedy for liver coughs, hemorrhoids, hepatic and splenic congestion, and gastro-intestinal disorders. The best of remedies for biliary catarrh and jaundice. Use of small doses of chelidonium where the tongue was somewhat pallid and enlarged, the skin sallow, full, and occasionally tinged greenish-yellow, the mucous membranes enfeebled and full, abdomen tumid, feces light in color, and urine of high specific gravity, and pale, but cloudy. A wild flower and poison species.
Papaver rhoeas L.	Papaveraceae	Musculotropic depressant and anticancer. The flowers for ailments. A mild pain reliever and for irritable coughs, it helps to reduce nervous over-activity. It is non-addictive. The plant should only be used under the supervision of a qualified herbalist. The flowers and petals are anodyne, emollient, emmenagogue, expectorant and hypnotic. An infusion is taken internally for bronchial complaints and coughs, insomnia, poor digestion, nervous digestive disorders and minor painful conditions. The latex in the seedpods is narcotic and slightly sedative. It can be used in very small quantities as a sleep-inducing drug. The leaves and seeds are tonic. They are useful in the treatment of low fevers. A wild flower.
Astragalus echinus DC.	Papilionaceae	Throat diseases. An emulsifier and energizer. Used by athletes for energy reserves. Useful in cold climates to warm body. Used with ginseng, it works as a total body energizer. A forage.
Astragalus sp.	Papilionaceae	May interact with medications that suppress the immune system, such as cyclophosphamide. May affect blood sugar levels and pressure. An adaptogen that may provide energy and stamina, boost the immune system, detoxify various drugs and metals, antiviral, improve peripheral circulation, counteract stress, and improve mental functioning. A potent anticancer agent and may be useful in the flu, respiratory infections, colds, high cholesterol, chronic lung weakness, HIV, tumors and throat diseases. Some *Astragalus* species can be toxic. A forage species.
Astragalus kahiricus DC.	Papilionaceae	The same uses as above.
Astragalus spinosus (Forssk.) Muschl	Papilionaceae	The glycoside from the extracts possess postive intropic properties. The alkaloidal fraction produce a spasmolytic effect, showed moderate histamine and serotonin antagonizing effects. The chloroform extract of the shoots showed some antispasmodic effect in addition to some antihistaminic and anti-serotonin effect.. The main action of the glycoside and the alchoholic extract of the shoot was a direct cardiac stimulant effect. The plant is used for throat diseases. A forage species.
Glycyrrhiza glabra L.	Papilionaceae	Bronchitis, peptic, duodenal ulcers and rheumatoid arthritis. Carminative, constipation, cough, gastrointestinal ailments, hoarseness and mouth care. It is also used to sweeten and flavor pharmaceutical preparations and as a binding agent in pills. A beverages and industrial species.

Table 2. (Cont'd).

Medicago sp.	Papilionaceae	A tea to treat arthritis, boils, digestive disorders, urinary tract infections and bowel disorders. The chlorophyll dispatch of bad breath. Sprouts in salads are very beneficial. A forage species.
Melilotus albus Medik	Papilionaceae	Analgesic, astringent, narcotic, rheumatism, carminative, diuretic and anticoagulant. It has blood thinning and anti-inflammatory activity. It is used for kidney stones. A flavoring agent.
Melilotus indicus (L.) All.	Papilionaceae	Skin rash, blood thinning, anti-inflammatory, diuretic, and for kidney stones. Infusion of flowering branches is emollient and antispasmodic. Seeds for diseases of genital organs of both sexes. A flavoring agent.
Psoralea sp.	Papilionaceae	Aphrodisiac, cooling, deodorant, dyspnea, fever, mastitis, and painful swellings. Poisonous.
Trifolium sp.	Papilionaceae	Rheumatism, gout and asthma. A forage species.
Plantago albicans L.	Plantaginaceae	Wounds, cough, bronchitis and as a purgative.
Plantago coronopus L.	Plantaginaceae	Laxative, anticonstipation and heal wounds.
Plantago lanceolata L.	Plantaginaceae	Antibacterial, antidote, laxative, ophthalmic and poultice. Stop bleeding and repair damaged tissue. The leaves extract has antibacterial properties. Leaves have a bitter flavor and are astringent, demulcent, mildly expectorant, haemostatic and ophthalmic. Internally, they are used for diarrhoea, gastritis, peptic ulcers, irritable bowel syndrome, hemorrhage, cystitis, bronchitis, catarrh, sinusitis, asthma and hay fever. Externally in treating skin inflammations, malignant ulcers, cuts and stings. The heated leaves as a wet dressing for wounds and swellings. The root is a remedy for the bite of rattlesnakes and seeds to treat parasitic worms. Seeds as a laxative and soothing irritated gut membranes. Distilled water made from the plant makes an excellent eye lotion. Used locally as a bones/wound healer, and to relief irritable bowel. Roots are stomachic while leaves are used in ophthalmic collyrium treatment, anti-allergic, anti-diabetes, against headaches, against abscess, cessation of breast feeding in babies, and in hair treatment. An edible species in salads.
Plantago ovata Forssk.	Plantaginaceae	Astringent, demulcent, diuretic, boils chronic constipation, diarrhoea, ulcers, venereal diseases and hemorrhoids. Seeds contain mucilage swells in intestines, acting as laxative and soothing irritated membranes. Bedouins use seeds as laxative. Seeds for gonorrhea and as diuretic.
Polygonum eguisetiforme Sibth. Et Sm.	Polygonaceae	Root tea as a mouthwash for cankers and sores. Used as a substitute for quinine when boiled and blended with oak bark. A weed species.
Polygonm aviculare L.	Polygonaceae	Stomach-ache, to cure the spitting of blood, anti-dysentery, excessive menstrual flow, lung disorders, bronchitis, jaundice, and gall and kidney stones. An astringent, coagulant, diuretic, blood circulation, urinary system and menstrual regulator. An expectorant and to treat sores. Anthelmintic, antiphlogistic, cardiotonic, cholagogue, emollient, expectorant, febrifuge, haemostatic, lithontripic, hemorrhoids, vasoconstrictor and vulnerary. Treatment of pulmonary complaints because the silicic acid strengthens connective tissue in the lungs. It is widely used in the treatment of wounds, bleeding, piles and diarrhoea. An alcohol-based preparation has been used to treat varicose veins. The seeds are emetic and purgative. A weed species.
Polygonum lapathifolium L.	Polygonaceae	Astringent, anti-inflammatory and anti-bleeding. A wild flower.
Rumex crispus L.	Polygonaceae	Rich in vitamins C and A. Roots contain chrysophanic acid and alkaloid rumicin, helpful in treating liver disorders. Soaked roots in vinegar used to treat ringworm. Leaves poultice for treating hives, rashes and itches and on animals to treat mange and saddle sores on pack animals. A source of black dye for woolens and also an ink stain remover. It is used in salads, soups, as a meat tenderizer and as a laxative and tonic. As a wild salad plant and pot herb. Roots and leaves as an astringent, alterative, and mild tonic. It has an action on the bowels operating without pain or discomfort. Used in ointments for skin irritations. An edible common species.
Rumex cyperius Murb.	Polygonaceae	A laxative, astringent, alterative, and mild tonic. It has an action on the bowels. Used in ointments for skin irritations. Well known as a kitchen herb. Common in hilly area.
Rumex dentatus L.	Polygonaceae	Purgative stimulates secretions, antidiabetic, and diuretic. as vegetables and in dye industry. It is astringent and used in skin diseases. A wild flower and common weed.
Rumex vesicarius L.	Polygonaceae	Purgative, antidote, and vermifuge. Anti-diarrhoea and to treat scorpion stings. A wild flower.
Portulaca oleracea L.	Portulaceae	Astringent, blood cleaner, demulcent, diuretic, emollient, hepatic and laxative. For fever, constipation, heptoses and nephrosis. It contains many biologically active compounds and is a source of nutrients. Some biologically active/ potentially toxic compounds include oxalic acids, alkaloids, omega-3 fatty acids, coumarins, flavonoids, cardiac glycosides, and anthraquinone glycosides. Traditionally considered as a comestible plant of high gastronomic, nutritive, and medicinal values. A pickle and a vegetable. Used for burns, headache, and diseases related to the intestine, liver, stomach, cough, shortness of breath and arthritis. In addition, as a purgative, cardiac tonic, emollient, muscle relaxant, anti-inflammatory and diuretic treatments make it important in herbal medicine. Treatment of osteoporosis and psoriasis. It is of high nutritive and antioxidant properties (Mohamed *et al.*, 2011). Richest source of alphalinolenic acid (ALA). contain high concentrations of soluble oxalates poisonous to sheep and goats. The whole plant, except the root, is used as antibacterial, and anthelminthic in form of juice. It is refrigerant and alterative, and also used in lower abdomen and urinary tract problems.

Table 2. (Cont'd).

Anagallis arvensis L.	Primulaceae	Epilepsy, sore throat, skin rash, snakebite, thirst and ulcers. It has an antifungal and antiviral activities, and used as a source of fungicides. It is an old remedy for skin itches with dry fiber like eruptions, especially of hands and fingers. A wild flower and common weed.
Ceratocephalus flacatus (L.) Pers.	Ranunculaceae	Antirheumatic for knee and joints. A weed species.
Ochradenus baccatus Del.	Resedaceae	Stomachache, in folk medicine for male sexual disorders. A flavoring agent and wild flower.
Reseda lutea L.	Resedaceae	Diuretic, sedative and soporific, a source of dye in the carpet and rug industries. important in animal husbandry, stock food source and in honey production. A wild flower and weed.
Retama raetam (Forssk) Webb.	Resedaceae	Control plasma cholesterol concentrations and reduce of morbidity and mortality due to vascular diseases. It influences diabetes mellitus and lipid metabolism. A forest tree.
Zizyphus lotus (L.) Lam.	Rhamnaceae	Antibacterial, anti-cancer, anti-diabetic, anti-nociceptive, anti-hypertensive and antidiarrhoeal. For toothache and gum with root powder or bark, and arthritis by paste of roots, leaves, branches. For intestinal ailments, colds and skin care. Leaf powder to wash and clean bodies of the dead. Leaf powder mixed with hot water is used by women as a hair wash, very effective as shampoo. Leaves to treat dandruff and counter obesity. Traditionally used as a stomachic, appetizer, astringent and a cough medicine. Leaf decoction is also used for head lice. Fruits are edible. A paste of dry fruits is used by Bedouins as bread in the winter. The wood serves for artistic woodwork, while the branches and trunk as firewood and high quality charcoal.
Zizyphus spina-christi (L.) Desf.	Rhamnaceae	Abdominal pain, constipation and intestinal parasites. It posses antibacterial, anti-cancer, anti-diabetic, anti-nociceptive, anti-hypertensive and antidiarrhoeal properties. An analgesic, cleanser, tonic, blisters, bruises, for chest pains, dandruff, fractures, headache, mouth and gum problems, respiratory problems, and rheumatism. Against cholesterol and cancer, eye inflammation and hair loss. Fruits are edible. Very common species.
Rubus tomentosus Borkh.	Rosaceae	For treating diarrhoea and healing wounds. Makes an excellent tea. Diuretic and used in treatment of cardiovascular diseases. An ornamental species.
Sarcopoterium spinosum (L.) Sp.	Rosaceae	Diabetes, diuretic, useful in renal calculi, edema, intestine pain, kidney disease and ulcer. Externally used for haemorrhoids. A wild flower.
Rubia tinctorum L.	Rubiaceae	Dysmenorrhea and puerperium. It is important as source of red dye. A weed species.
Haplophyllum tuberculatum (Forssk.) A. Juss	Rutaceae	Backache, muscle-cramps and eye inflammation, febrifuge, local antipoison, vomiting, nausea, constipation, malaria, difficult childbirth, anemia, gastric pains, intestinal worms, ear troubles, and aphrodisiac. Decoction for rheumatic pains. Abortifacient, analgesic, sedative and stimulant. It is also used in chest pains, dysmenorrhea, flatulence, gastrosis, hysteria and puerperium, Abdominal pains and digestive system. An aromatic flavoring agent
Populus euphratica Oliv	Salicaceae	Febrifuge, diuretic, stimulant and anti-rheumatic. A forest species.
Salix alba L.	Salicaceae	Bark is pain reliever and fever reducer. An antiacid in stomach troubles. Salicin is closely related to aspirin and produces similar effects as a pain reliever. A forest species.
Antirrhinum orontium L.	Scrophulariaceae	Liver diseases, astringent, detergent, diuretic, scurvy and tumor. It has bitter and stimulant properties, Leaves have been employed in cataplasms to tumors and ulcers. Preservative against witchcraft. The numerous seeds yield a fixed oil. A weed species.
Scrophularia hypercifolia Wydl	Scrophulariaceae	tuberculosis and arthritis. A powerful painkiller equal to that of cortisone and twice as effective as indomethacin, to treat arthritis. Exerts analgesic effects, to reduce edema, cell infiltration and proliferation of activated T-lymphocytes in joint tissues. It inhibits a number of inflammatory factors, it is the source of a unique glycoterpenoid, verbascosaponin A, which is twice as potent as indomethacin for relieving inflammation and pain. A **w**ild flower.
Verbascum fruticulosum Post	Scrophulariaceae	The plant is used against the symptoms of pulmonary consumption/tubercular lung disease, gout, falling sickness, hair loss, cramps, megrins, and as an antitussive. Cough, asthma, migraine, ringworm, ear infection and consequent deafness, itching eczema, otorrhoea, enuresis, frost-bite, bruises, and piles. Famed for curing cattle of 'the scab' and lung diseases. Helps pulmonary ailments. Strengthens sinuses, relieving swollen joints. A wild flower and weed.
Verbascum thapsus	Scrophulariaceae	Antitussive. The leaves as diapers. Oil is used to treat stretch marks.
Datura metel L.	Solanaceae	Asthma, epilepsy, arthritis, cramps, dysmenorrhea, lumbago, rheumatism, sciatica, cardiac pains, distress and worms. It is analgesic, sedative, anodyne, anthelmintic, **a**ntispasmodic, and narcotic. Leaves are used in earache. Fruit juice is applied to scalp for curing dandruff and falling hairs. The leaves are applied to boils, sores and fish bites. Seeds are useful for patchy baldness. It is a source of allelochemicals and poison species.
Hyoscyamus aureus L.	Solanaceae	Analgesic, for eye infections and rheumatism. All parts of the plant are very toxic. Symptoms include impaired vision, convulsions, coma and death from heart or respiratory failure.

Table 2. (Cont'd).

Lycium europaeum L.	Solanaceae	Leaves ash to cure boils and their paste with coconut oil for skin diseases. It is effective for abdominal pains in children and digestive system. Berries and leaves are also edible when fresh and used in salads. Fruits powder is used with cow milk for semen enrichment. A wild flower.
Lycium depressum Stocks	Solanaceae	High blood pressure and diabetes. A wild flower.
Lycium shawii Roemer & Schultes	Solanaceae	Diuretic, hepatic, laxative, tonic, colic, jaundice and to improve vision. A wild flower.
Nicotiana qlauca B.C. Graham	Solanaceae	Leaves in hunting rituals and as a poultice for swellings, bruises, cuts, wounds, boils, sores, inflamed throat, and swollen glands. An infusion of the leaves as a steam bath in rheumatism. It is an ornamental and a poison species, all parts of the plant are poisonous, contain the toxic alkaloid nicotine. The leaves have been made into a drink and smoke. Ingestion of the leaves can be fatal. Nicotine has been extracted and used as an insecticide. Recent studies however, suggest *Nicotiana glauca* to be used as a treatment for nicotine addiction since it does not contain nicotine but instead, the active ingredient is anabasine.
Solanum incanum L.	Solanaceae	Bruised fingers, dyspepsia, earache, flatulence, hemorrhoids, toothache, ulcers and weeping wounds. Root chewed for abdominal cramps; fruit juice to ease extraction of foreign body (eg. thorns) from body. Wild flower and gene source species. Fruits are poison.
Solanum nigrum L.	Solanaceae	Expectorant and used for bruised fingers, anti-rheumatic, burns, cholecocystitis, fever, gonorrhea, nephrosis, stomachache, skin diseases and ulcers. For neuralgia, backaches, breast pains, swollen legs, potential miscarriage, wounds and sun burn. For inflammation, tumors and hemorrhoids, a liver medicine, sedative narcotic and erysipelas. Berries may be eaten but alkaloids concentration. Leaves are also edible before flowering and rich in minerals. Weed.
Solanum elaeagnifolium Cav.	Solanaceae	Solasodine used in contraceptive and corticosteroid drugs. Plant extracts have moluscicidal, nematicidal and cancer-inhibiting activity. A noxious weed, wild flower and poison.
Withania somnifera (L.) Dunel.	Solanaceae	Sedative, for burns, infertility, scorpion stings, snakebites, sunburn, swellings, wounds, narcotic, analgesic, antibacterial and impotency. Alcoholism, debility, dysphonea, emphysema, neurosis, ophthalmia, rheumatism, spermatorrhea, tuberculosis, aphrodisiac, deobstruent, lactagogue and nervine. Root is anti-epileptic. Seeds and fruits are diuretic. Leaves are used for tumors and tuberculated glands and the tuber in inflammatory conditions, psoriasis, ulcers and scabies. Roots as sedatives narcotic. For stomach ailments, strangury and as a tonic. An extract from boiled leaves is useful against cough, fever and ulcer painful. The fruit is a remedy for toothache, and stomach problem and seeds in stomach pain and digestions; and regulation of menstrual cycle. The plant is highly toxic.
Tamarix pentandra Pall.	Tamaricaceae	*Tamarix* spp. are of hepatotonic and stimulant properties**.** The plant is used for fever, headache, sores and wounds. Certain species (*T. aphylla*) are very often cultivated for shade, others produce galls containing 40% tannin, and some are used for carpentry and building constructions. Tamarisk can be used to control the insect vector of a disease leishmaniasis. One of the products control the vector of this disease is *Tamarix aphylla*. A forest common tree.
Tamarix tetragyna Ehrenb.	Tamaricaceae	Hepatotonic and stimulant properties. Galls of certain species used in tooth powder for polishing and removing the decayed parts of teeth, for halitosis and general protection of the mouth. Used also for hemorrhage, dysentery, eyes and dentifrices. A common forest tree.
Typha angustifolia L.	Typhaceae	Species of *Typha* are used as refrigerant, sedative, tonic and vulnerary. The leaves are diuretic may be mixed with oil and used as a poultice on sores. The pollen is astringent, diuretic, emmenagogue, haemostatic, supportive and vulnerary. The dried pollen is anticoagulant and haemostatic. It is used internally in the treatment of kidney stones, hemorrhage, painful menstruation, abnormal uterine bleeding, post-partum pains, abscesses and cancer of the lymphatic system. Externally, in the treatment of tapeworms. Used for diabetes, fever and stomach pain. *Typha* spp. are ornamental plants, cylindrical spikes used for decoration. Leaves are good source of paper pulp. The stems and leaves can be used in making paper woven into mats, chairs, hats etc. They are excellent addition to the compost heap or used as a source of fuel. The pulp of the plant can be converted into rayon and stems to make rush lights. The female flowers make excellent tinder. A fiber is obtained from the blossom stem and flowers and from the leaves for making paper. The hairs of the fruits are used for stuffing pillows. They have good insulating and buoyancy properties and have also been used as a wound dressing. The pollen is highly inflammable; it is used in making fireworks. The plant should not be prescribed for pregnant women. An ornamental and industrial common aquatic species.
Typha latifolia L.	Typhaceae	Coolant, carminative, analgesic, soothing agent and for burns. Sliced and chopped stems are spread upon wound, burns and sores. Taken internally to quell diarrhoea, kill worms, and for gonorrhea. In hyper cholesterol and haematemesis. The inflorescence is cooked as vegetable. Sometime the grains are mixed with honey and are applied on wound to treat internal bleeding and urinary problems. Ropes have been formed from its leaves. Dried leaves are also used as fuel, in thatching roof and making baskets and mats. An ornamental and industrial aquatic species.

Table 2. (Cont'd).

Ammi majus L.	Umbelliferae	Seeds contain thymol and are used in folk medicine as a carminative, anti-spasmodic and psoriasis. Fruits are diuretic, used for angina pectoris and asthma. However, should be used with caution because of poisonous effects. Stem and leaf basis are edible, cause horse blindness. A weed species.
Apium nodiflorum (L.) Lag.	Umbelliferae	The leaves and roots are edible and used in folk medicine as a diuretic, tonic, carminative, appetite stimulant, anti-rheumatic, sedative, antispasmodic and in dough stuffing.
Eryngium creticum Lam.	Umbellifereae	Liver diseases, poisoning, anemia and infertility problems. For kidney stones, gall bladder problems, and antidote. For snakebite; digestive system, ulcers and intestines parasites. Edible.
Eryngium glomeratum Lam.	Umbellifereae	Diuretic, renal stones and for skin diseases. Edible as salad plant.
Paritaria diffusa Mert. Et. Koch	Urticaceae	Diuretic and depurative (particularly the leaves). Externally used for burns. A weedy species.
Urtica pilulifera L.	Urticaceae	Cancer, stomachache, intestine pain and inflammation, liver and circulatory system diseases. The young, spring greens are tastier than spinach and rich in iron and vitamins A and C. Companion planting nettles with aromatic herbs is said to increase their oil content. Makes a greenish-yellow dye. Styptic and diuretic. Weariness and exhaustion, pains in legs and muscle spasms. Partially edible, rich in minerals. A stink weed.
Urtica urens L.	Urticaceae	Antirhumatic, styptic and diuretic. Partially edible, rich in minerals, it is a stink weed.
Verbina supine L.	Verbinaceae	Menstrual flow, antidiarhoeal, liver disease, fever and stomach pain. Antibacterial, anticoagulant and antitumor. Herbal tea but during pregnancy might cause miscarriages. Root for dysentery, headaches, fever, and insufficient lactation. Decoction for dermatitis or eczema.
Vitex agnus-castus L.	Verbanaceae	Burns, colds, eye diseases, colic, gastric disturbance, toothache, headache, stomachic and joints pain. A tonic for the reproductive organs. Stimulates and normalizes pituitary function, especially as relates to progesterone; helps to restore a normal estrogen-to-progesterone balance. Used for spotty periods, insufficient lactation, hot flashes of menopause. Balances female sexual energy by lowering oversex drive and increasing drive in low sexual vitality. Alleviate symptoms of various gynecological problems. Used for PMS, cyclical mastalgia, mild hyperprolactinemia and luteal phase defect. It should not be taken with hormones. An excess produces the sensation of crawling skin. A uterine stimulant should not be taken during pregnancy. An ornamental, flavoring agent.
Vitex pseudo-negundo (Bornm) Hand-Mazz	Verbanaceae	The same as for *V. agnus-castus*
Viscum cruciatum	Viscaceae	Reduce blood pressure and bend thus arteriosclerosis caused age complaints forwards. Adjust cycle fluctuations of the higher age and relieve heart and cycle noticeably. The associated subjective complaints are eliminated as collapse inclination, swindles, nausea, headache, morning tiredness and ear rushing. The dried young twigs and leaves are employed against epilepsy, convulsions, and giddiness. It was thought to lessen reflex irritability and strengthens the heartbeat. Chewing berries provide immediate relief from stitches. Parasite and poison.
Fagonia arabica L.	Zygophyllaceae	Anti-inflammatory, analgesic, antioxidant and antierythema activity. A forage species.
Fagonia mollis Del.	Zygophyllaceae	Antioxidant. Boiling water of plant used to cure bile and used on topological applicants and leaves paste with boiled water used to cure diarrhoea. A forage species.
Peganum harmala L.	Zygophyllaceae	Analgesic, anthelmintic, narcotic. Used in gastrosis, kidney stones, rheumatism and worms. A wild flower and poison species.
Tribulus terrestris L.	Zygophyllaceae	Aphrodisiac, antiseptic, diuretic, coughs, urinary disorders and diarrhoea. Decoction or powder of the whole plant is used as a general health tonic. Given to cattle for more lactation. Cystitis, dysuria, gonorrhea, gout, gravel, nephrosis, demulcent, spermatorrhea, urethritis and aphrodisiac. It is a sheep poison. Weed species.
Zygophyllum coccineum L.	Zygophyllaceae	Contain saponin. Aqueous extract reduce blood pressure, diuretic, antipyretic, local anesthetic with anti-hestamine activity. In folk medicine for rheumatism, gout, cough, asthma, hypertension, and flatulent colic. Anodyne, antiinflammatory, anthelmintic, worms and hypoglycemic. Possibly good for diabetes. A wild flower in dead sea area..
Zygophyllum dumosum Boiss.	Zygophyllaceae	Medicinally used the same as for *Z. coccineum*.

Discussion

In the present study, natural populations of certain study sites reached an acceptable level of development, where many sensitive, shrub or tree species were flourishing. The studied sites however, are not fertile in all parts and probably not as others in the Valley, but occurrence of many woody perennials is an indication on good growth factors available and may be low hazards.

Differences in species and family's occurrence and richness in different sites probably indicate specific growth requirements or better tolerance and adaptation. Plant species differ in tolerance to total salts and to specific ions (Poljakoff-Mayber & Gale, 1975; Fitter & Hay, 1983). Certain species are highly tolerant to the shortage or excessive supply of one or more ecological factors, while others are sensitive. However, when water availability is limited, plants struggle for survival, and production of a large array of secondary chemical metabolites is considered as a survival strategy (Harbone, 1988). Medicinal and aromatic plants are important

sources of these chemicals used as pharmaceuticals. These appear to be protective agents for plants against biotic (Fraenkle, 1959) and abiotic stresses including salinization (Harbone, 1988).

In the Jordan Valley, temperature and water determine the type of cultivation and species distribution. Water quality (e.g. salt levels) is important in determining the type of plant species in certain locations, in addition to human activities. Heavy grazing leads to uprooting of higher plants and replacement of these by poisonous species. Our data showed that certain species were dense and mainly localized at the headwater, but their densities and frequencies declined toward the mouth of the wadies. Water becomes generally more saline as it moves closer to the river and thus new or dense plant populations of certain species better tolerating these conditions were appeared. This itself creates a salinity problem and salts create problems when and where the water evaporates.

Ecological factors or disturbances have created differences in the distribution of plant species within and between sites. It is clearly shown that certain species were abundant in saline soils and their populations became denser and widely spread in Al-Zor area (close to the River). However, some halophytic species undoubtedly exist but it seems that most species occupying saline habitats are facultative halophytes and have been restricted to the habitat as a result of failure to compete under glycophytic conditions. This could be judged from other species of glycophytes found in different study sites but with very low number of scattered individuals.

However, species adaptation to saline conditions could be achieved through different physiological, and / or anatomical adaptation including the wide spread of aerenchyma tissue in many salt marsh species that indicate gaseous diffusion. Gaseous exchange and internal diffusion take place in both mangrove (Chapman, 1966) and salt marsh plants (Teal & Kanwisher, 1966; 1970).

Plants counteract salinity and drought effects also by activation of biochemical responses that include synthesis and accumulation of osmolytes, maintaining the intracellular ion homeostasis and scavenging of reactive oxygen species generated as a secondary effect of drought (Flowers, 2004; Ashraf & Akram, 2009).

Actual exclusion of salt through root systems or foliage parts is also possible. *Tamarix pentandra* plants in Sweimeh marsh water and at the lower part of Ain Nkhail, close to Ardani road, and *Atriplex halimus* plants, probably excludes salts through foliage parts.

Root depth plays a role in this regard. Ginzburg (1969) reported that the compactness and degree of branching highly depend on the conditions of the particular habitat. The roots of certain species can reach a depth of 4-5 m, and roots of *Prosopis farcta* and *Alhagi maurorum* can reach 20 m depth.

In hydrophytes, the whole radial wall of the endodermis was covered with the Casparian strip (Poljakoff-Mayber & Gale, 1975). These had a rather narrow cortex with only 2-3 layers of cells, while plants of dunes and riverbeds had four or more layers. *A. halimus*, has been reported to show a thin cortex, like real halophytes, while *P. farcta* although collected from a saline environment, had a relatively wide cortex (Poljakoff-Mayber & Gale, 1975). An exceptionally wide cortex was found also in *Tamarix aphylla*. However, *Tamarix* roots were reported to have a distinct epidermal layer and several subepidermal layers of cells that appear to be different from those of the rest of roots. The cytoplasmic density and also the density of Golgi elements seem to be very high (Poljakoff-Mayber & Gale, 1975).

In glands of *Tamarix*, the number of mitochondria was high in the outer secretory cells, low in the middle and in the inner secretory cells. Glands of *Frankenia* (widely spread near Well No. 6 and lower parts of Zarqa River) of the Frankenaceae, a closely related family to Tamarixaceae, appear similar to those of *Tamarix* in most respects but the secretory cells in the glands of *Frankenia* appear to have denser cytoplasm. However, Kleinkopf and Wallace (1974) found that 65% of leaf sodium, 82% of leaf Cl^- of the *Tamarix ramosissima* could be removed by washing, and the growth reduction this species showed was apparently due to energy losses through the increased respiration maintaining salt excretion.

Formation of large salt vacuoles is another anatomical adaptation (Poljakoff-Mayber & Gale, 1975; Fitter & Hay, 1983). In *Atriplex*, the salt accumulates in large vacuole of the bladder cell (Luttge, 1971) and is released to the leaf surface with subsequent rupture of the bladder cell. The salt is not released directly to the wall and the direct backflow into the tissues does not exist. When the plants are grown in highly saline media the glands always contain much higher concentration of Na^+ and Cl^- ions than the sap from the leaves (Baumeister & Kloos, 1974). The glands are highly selective. Luttge and Osmond (1970) have reported an increase in the chloride concentration of the bladder cells of the trichomes of this species, which are apparently more directly linked to photosynthesis and this is subsequently dependent on an energy sources of the measophyll.

Leaf hairs, salt glands, or vesicles serve as means for the plant to concentrate salts in the vesicles, thus excluding them from the cells and tissues. Osmotic adjustment is another physiological adaptation. Cells increase salt levels in the vacuoles and thus avoid higher levels in the cytoplasm. Plants are able to take up water from the soil by means of the higher osmotic potential of the root and stem tissues. Another means of osmotic adjustment is through synthesis and concentration of nontoxic solutes in the cytoplasm. The species of Chenopodiaceae commonly accumulate glycine-betaine in the cytoplasm, allows plants to offset high salt concentration in the vacuole and to maintain equilibrium with the soil salinity.

Development of water storage tissues to reduce the high osmotic pressure is also implicated in plants adaptation to salinity problems. This type of control is exemplified by *Salicornia* and *Suaeda* species (among the most spread species in the highly extension area of 14.5 km). *S. europea* was found responding in a simpler fashion to a range of NaCl concentration from 0 to 250 mM (Austenfeld, 1974) possibly uses oxalate to inactivate Ca when grown at low salinity, and Na at high salinity. However, under conditions of high evaporation demand of the atmosphere, root resistance may become the dominant factor and bring about a decrease of turgor. In

many halophytes, NaCl specifically stimulates succulence and an increase in the water content per unit dry weight and there is an intriguing link between succulence and Crassulacean Acid Metabolism (CAM) such as for *Mesembryanthemum crystallium.*

In general, osmotic adjustment is achieved mainly by active salt accumulation in the cell. In some plants, salt absorption is passive with the transpiration stream. Many glycophytes absorb sodium into the roots, but its transfer to the tops is blocked. In such plants osmotic adjustment is attained by breakdown of polysaccharides or release of ions from bound sites within the cells (Fitter & Hay, 1983).

The simplest form of salt excretion is through the loss of organ, which has become saturated with salts. *Juncus maritimus* a wide spread aquatic species in certain sites (mainly in Wadi Zarqa and Ain Nkhail) in the Jordan Valley has been reported to control salt accumulation through the annual loss of salt-concentrated organs, and some succulent perennials balance salts in this fashion. However, the relationship between accumulation and abscission may be complex with high salt levels may hasten senescence (Prisco & O`Leary, 1972). Halophytes abscission is most significant in rosette plants, which continually produce new leaves as the old one senesce (Albert, 1975). More active excretion also occurs, when salt is actively withdrawn from the xylem back into the xylem parenchyma (Yeo *et al.*, 1977) and possibly extruded from the roots back into the medium. This however, may lead to the buildup of toxin in the root zone of plants.

There seems to be no evidence that even the most halophytic plants thrives under highly saline conditions. Plants may tolerate, strategically avoid, or cope with salinity. In the present study, *T. pentandra* plants were found suffering and many were died as a result of highly saline condition at the lower part of Wadi Zarqa area close to Al-Zor area. However, most metabolic and structural changes are probably signs of salinity damage but only few may be considered of truly adaptive value, for example,

a. Increased concentration of abscissic acid which reduce passive uptake of salt.
b. Increased dark respiration. This applies energy for pumping salts against electrochemical gradients and facilitates essential compartmentalization.
c. Performance for Crassulaceaen acid metabolism versus C_3-Carboxylation in CO_2 fixation.

However, the response of plants to saline environment is highly concerned with the utilization of saline soils, the prevention of secondary salinization and the usage of slightly saline water in agriculture. The problem of salinity is widely spread in most of the studied sites. There is an actual need to bring new area under cultivation or to reclaim for cultivation areas that were abandoned due to secondary salinization. This could be done probably by the use of salt tolerant halophytes or salt adapted glycophytes at early stages of reclamation.

Saline habitats are distinguished by their special vegetation of halophytes found in all study locations, while apparently no attempt has ever been made to domesticate such species except for few (*Asparagus* sp., *Atriplex* spp., and *Salsola* sp.) and in a small scale in certain sites.

Conclusions

Salt-tolerant plants are either conventional crops tolerate a low salt level, or other facultative or obligate wild halophytes. Plants can grow on saline soils by either avoidance or tolerance of salts in the soil. However, salt resistant species can avoid harmful effects of salt in different ways (Poljakoff-Mayber & Gale, 1975; Fitter & Hay, 1983).

Searching for alternatives to traditional crops for use in arid and saline areas seems to become of high national interest with the increase in desertification. Several studies worldwide have shown that many crops` wild relatives can offer higher levels of tolerance to salinity which can be transferred to cultivated crops through breeding. Some conventional crops are adapted to saline conditions by physiologically avoiding the damage effects of salts. Others such as halophytes have physiological/phytochemical traits enable them tolerate the absorbed salts.

The present survey showed that hundreds of species were naturally growing in saline soils and/or water in the Jordan Valley. Many can be used for various purposes and pave the way towards an increased agricultural productivity in arid and saline areas of the country. However, this study must be extended to cover other parts suffer salinity problems in the country and there is a great potential to develop future crops highly tolerating saline conditions, either from natural or domesticated species, but this requires better understanding of the nature and dimensions of the problem and improved resources to counteract salinity.

Acknowledgments

The author wishes to express his gratitude to the Deanship of Academic Research, University of Jordan for providing transportation facilities throughout the study period.

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(Received for publication 15 December 2013)