Libyan Agriculture Research Center Journal International 1 (4): 231-243, 2010
ISSN 2219-4304


# Ethnobotanical and Ecological Studies of Wild Edible Plants in Jordan

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**Abstract:** This study clarified ethnobotany and ecology of wild edible plants in Ajlun and Tafileh districts in Jordan. Semi-structured interview, field collection and observation, group discussion, market survey and pair wise ranking method were employed to gather these ethnobotanical data. The obtained information was collected from informants of three community groups namely, Rural farmers (RF), Beduine shepherds (BS) and semi urbans (SU) people. The study documented 142 edible plant species belonging to 84 genera and 28 families. Of the reported edibles, all of the documented species have at least two uses or more, Medicine uses contributed approximately 52% out of the total uses, forage 42% and fire wood had contributed only 6%. All of the recorded wild edible plant species were reported to be edible both in normal and food shortage times. Procurement and use of most edibles were found to be age and gender specific. However, the percentage utility of wild edible plant species under various use categories does not vary among the community groups and they have in general the same species uses, ($X^2$ from tables = 12.592, df = 6, " = 0.05 while $X^2$ calculated is much less). The study showed that the majority of the species were collected from wooded grassland, farmlands, disturbed and forest land vegetation type. Pair wise ranking results indicated that agricultural expansion, over stocking/overgrazing, fuel wood collection and uncontrolled fire setting as principal threats to wild edible plants in the study areas. The findings suggest that (i) Public and community awareness based on management need to be encouraged at all levels in order to overcome the threats appointed at (ii) Further investigation into nutritional properties of all the species reported; and (iii) Since the species are also with therapeutic potentiality, study on the pharmacological attributes would help to understand their medicinal applications. Furthermore, urgent collection of germplasm from areas under human pressure is recommended to initiate what is called national seed banks of threatened species.

**Key words:** Taxonomy % Ecology % Wild plants % Edible Plants % Jordan

## INTRODUCTION

Jordan lies between longitudes 35° 40' and 39° E and between latitudes 29° 30' and 34° N in the transition region between the middle east countries. Jordan is of great interest in vegetation ecology because it is the meeting place of the Mediterranean, Irano-turanian and Saharo-arabian regions or the Nubo-sindian region. For this reason there are conspicuous changes in the vegetation and in the composition of the flora over relatively short distances (within 30 km on the western slopes of the border mountains). Ajlun and Tafileh mountains are good representatives of northern and southern parts of Jordan and considered among the highest highlands which support forests and woodland vegetation due to unique climate and topography [1-6].

The earlier works on plants and vegetation showed that less than 5% of the nearly 3000 higher plants of Jordan are edible. Of these, 142 wild plant species are documented. Still many more wild species are believed to be edible and undocumented yet. More recently, some ethnobotanical studies have undertaken in some parts of the country. However, the majority of these studies have dealt with medicinal species and little emphasis has been paid to wild edible plants. This study has therefore sought to document indigenous knowledge related to uses of wild edible plant species and to assess the existing threats to wild edible plants in the study areas[7-9].

The studied areas are dominated by a mosaic form of phytogeographical elements mentioned above extending within certain narrow slope strips which often bended to the west towards the Jordan rift valley reflects the complexity of topography; since the diversification of bioclimate is highly related to the fluctuations in topographic factors[10].

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Millions of people in many developing countries do not have enough food to meet their daily requirements and a further more people are deficient in one or more micronutrients. Thus, in most cases rural communities depend on wild resources including wild edible plants to meet their food needs in periods of food crisis. The diversity in wild species offers variety in family diet and contributes to household food security. Numerous publications provide detailed knowledge of edible wild plants in specific locations in Africa [11-13]. All showed that wild plants are essential components of many Africans' diets, especially in periods of seasonal food shortage. A study conducted in Jordan northern villages of Ajlun revealed that some poor households rely on wild fruits and herbs as an alternative to cultivated food for a quarter of all dry season's meals [14-18].

Similarly, in southern part of Jordan in Tafileh villages, leafy vegetables and other bush foods are collected as daily supplements to relishes and soups [19-21]. In some parts of the world, wild plants is still of great importance and contribute a greater share to the annual diet than domesticated crops. Various reports also noted that many wild edibles are nutritionally rich with certain micronutrients and can supplement nutritional requirements, especially vitamins and trace minerals. Nutritional analysis of some wild food plants demonstrates that in many cases the nutritional quality of wild plants is comparable and in some cases even superior to domesticated varieties [6, 22-24].

It is speculated that Ajlun and Tafileh mountains may have been the center of origin for *Quercus* and *Juniperus* species from which they migrated to the lower peripheral regions south or west or even to the north through many ways especially via cap fruits and pollen grains [10, 25].

Inhabitants and residents have largely impacted this area and adjacent woodlands by different ways and methods to get pasture, timber for fuels and building materials and implements since these forests are not protected, they are free opened for public and grazing animales which gives a real evidence that these pressures influenced by the human activities and have helped to bring about a shift of middle eastern woodland to the north and west, so these high impact pressure forces make the regeneration also been seriously curtailed [26, 27].

It is worthful to say that this comparison survey in Ajlun and Tafileh woodlands inform of concrete representaive data is very important and still be the comprehensive purpose of this study which might be helpful in characterizing the vegetation structure types dominated within the investigated area for the benefits of human whose the center of the ecosystem.

The study was conducted in Ajlun and Tafileh districts, North and South Regions of Jordan with three social communities namely, rural farmers(RF), Beduine shepherds(BS) and semi urban communities. The rural people populations are the dominant social communities of both Ajlun and Tafileh districts respectively. In all communities, the majority of the people practice almost similar traditional botanic and economic activities, mixed farming (crop and livestock production). The three communities, share overlapping ecological niches, culture and religeon. The districts cover humid highland (>1200 m), intermediate climate and semiarid lowland (<800 m.). The study areas showed variation in vegetation cover from patches of tall forest trees on the plataue and slope of the escarpments to wooded grassland of the plain areas of both Ajlun and Tafileh districts.

The lowest land areas are covered by various shrubs and grasses in both districts dominated mainly by irano-turanian and saharo-arabian phtogeographical elements. Some of the common shrubs of bush land and wooded grassland include small-leaved species of *Rhus coriaria* L., *Rubus canescens* DC., *Sarcopoterium spinosum*(L.)Spach., *Ziziphus lotus*(L.)Lam., *Ziziphus spina-christi*(L.)Will. and *Crataegus azarolus* L.. On the hills and hill slopes, tree species like *Juniperus phoenecia* L., *Quercus coccifera* L., *Quercus ithaburensis* Decne, *Pistacia atlantica* Desf., *Pinus halepensis* L., *Cupressus sempervirens* L. and *Pistacia palaestina* Boiss occurred randomly.

The study is trying to answer the following four questions.

- To make a taxonomic survey of wild edible plants species distributed in the study areas with their relevant names and habitat distribution.
- To identify the edible form, part used, percentage of use report and other uses.
- To compare the percentage of general utilities of wild edible plants among the social communities of both study areas. Information gathered through semi-structured interview was presented using percentages and ranking. Chi-square ($X^2$) statistical test of homogeneity was calculated to test the null hypothesis to determine if no difference in use of wild edible plants under various use categories among the study communities is present.
- To apply the pair wise ranking of factors threatening the wild edible plants.

## MATERIALS AND METHODS

Six study sites from Ajlun district and five from Tafileh were conveniently selected based on vegetation cover and altitudes. Seventy-two informants of different age groups (30 from Rural farmers, 22 from Semi Urbans and 20 from Beduine Shepherds) were interviewed. The informants were selected from agricultural experts and native Beduines in study areas [21]. The study was conducted using semi-structured interview, field observation, group discussion, market survey and pair wise ranking. Pair wise ranking was conducted to understand local peoples' perception on activities threatening wild edible plants and the number of possible pairs was calculated using the relation N (N-1)/2, where N is the number of factors (activities). Accordingly, the most five factors threatening wild edible plants were identified with the community. The total number of pairs was determined using the formula and the ten pairs arranged and presented to informants to choose one from the two threats at a time. Then, the scores from each respondent summed-up, the ranks determined and the factor that received the highest total score ranked first. Specimens of wild edible plants were collected, identified and given their relevant names.

Furthermore, testing of null hypothesis is used to determine the significance of general utility percentage among the communities through applying Chi-square ($X^2$). Correspondence analysis was exercised for use report frequency and the first axes which contributed most of the total variation, were used as input for further analysis in pair wise ranking of threat factors of wild edible plants in the investigated areas [8, 19].

## RESULTS AND DISCUSSION

List of all the recorded plant species and uses are presented (Table 1 and 2). Compositae (Asterceae), Legumiosae (Fabaceae), Umbelliferae, Cruciferae (Brassicaceae), Malvaceae, (Lamiaceae) Labiatae, Rosaceae, Polygonaceae and Rhamnaceae had the highest proportion of edibles with more than 5 species each [2, 3, 28]. The results of the study revealed that the majority (86%) of the species have multiple uses and serve for more than one use categories. Taxonomic diversity of the flora of the study area is rich and highly diversified provides diverse useful species.

The study documented 142 wild edible plant species classified among 84 genera and 28 families. Four major use categories namely, Edible, fuel(fire) wood, Forage and herbal medicine had contributed 80% of the total uses. Most of the recorded and identified species are reported to be edible elsewhere in Jordan and in other neighbouring middle east countries. For example, of the species recorded in this study, some authors documented many of the overlapping among the edibles species with other utilities [5, 16, 17, 24]. The growth forms of the species include shrubs, trees, herbs and climbers. Shrubs and herbs make up the highest proportion of the edible species. Fruits, leaves and seeds are the parts used widely by the three social communities in the study area. The results also revealed that some of the reported species are familiar and used commonly in the study areas (Table 1 and 2).

The rural farmers' people affirmed that 80 (56.4%), semi urbans; people 63 (44.4%) and Beduines Shepherds 71 (50.0%) of the 142 edibles recorded in this study are edible species. More than 60 species are shared and commonly used among the communities in the areas at different levels. Edibility of these species over wider areas among different communities indicates the existence of common knowledge across a range of subsistence groups of different culture and geographic areas.

In comparison, the rural farmers and Beduine shepherds shared more number of edible species. More than 100 species have even similar names in rural farmers and Beduine shepherds local common names. Similarity in knowledge of these species is also reflected in the preparation of the various traditional food cultural dishes prepared (Table 1 and 2). This similarity between social communities surely be attributable to the sharing of an overlapping ecological niches, culture and religeon especially for these species mentioned in holly Quran and Bible.

The social interaction between communities through trade or due to proximity with one another might have over the years passed on the culture and knowledge on use of certain edible species to others permits the sharing of overlapping in edible species with other general utilities by the social communities' people. It is worthwhile to mention that many of the endangered species such as *Ammi majus* L., *Arum dioscoridis* Sibth. and Kit., *Arum hygrophilum* Boiss, *Asparagus aphyllus* L., *Cichorium pumilum* Jacq., *Coriandrum sativum* L., *Crocus aleppicus* Baker, *Crocus cancellatus* Herb., *Crocus moabiticus* Bornm.and Dinsm., *Cyclamen persicum* Miller, *Eryngium creticum* Lam, *Foeniculum vulgare* Miller, *Glycyrrhiza glabra* L., *Gundelia tournefortii* L.,

Table 1: List of edible plants with their families, English names, local names, habit and habitat distribution, rural farmers (RF) , Beduine shepherds (BS) and Semi urban (SU)

| No. | Scientific name | Family | English names | Local Names | Habit | Habitat distribution |
|---|---|---|---|---|---|---|
| 1. | *Alcea setosa* (Boiss.) Alef | Malvaceae | Marsh mallow | U'waynat Al Bakara (BS)<br>Wardet Al-Ghula (SU) | herb | Forest |
| 2. | *Allium ampeloprasum* L. | Liliaceae | Wild leek | Thum al arab (RF) | herb | Forest margins |
| 3. | *Ammi majus* L. | Umbelliferae | Bishop's weed | Sannirieh (SU) | herb | Farmland |
| 4. | *Anchusa hybrida* Ten | Boraginaceae | Alkanet | Mussais (SU) | herb | Disturbed land |
| 5. | *Anchusa italica* Retz. | Boraginaceae | Alkanet | Mussais (BS) | herb | Disturbed land |
| 6. | *Ankyropetalum gypsophiloides* Fenzl | caryophyllaceae | soapwort | Shirsh al-halawa (BS)<br>A'slaj (SU) | herb | Road banks |
| 7. | *Apium graveolens* L. | Umbelliferae | Wild celery | Krafs barri (SU) | herb | River Banks |
| 8. | *Apium nodiflorum* (L.) Lag. | Umbelliferae | Dwarf celery | Kurrat Al A'in (BS) | herb | River Banks |
| 9. | *Arbutus andrachne* L. | Ericaceae | Oriental strawberry tree | Kaykab (SU)<br>Katlab (BS) | tree | Woodland |
| 10. | *Arum dioscoridis* Sibth. and Kit. | Araceae | Spotted arum | Luf murakkat (SU) | Cormous herb | Disturbed land |
| 11. | *Arum hygrophilum* Boiss | Araceae | Water arum | Luf saqi (BS) | Cormous herb | Farmland |
| 12. | *Arum palaestinum* Boiss | Araceae | Arum | Luf (SU) | Cormous herb | Woodland |
| 13. | *Asparagus aphyllus* L. | Liliaceae | Wild asparagus | Ajram (RF) | herb | Woodland |
| 14. | *Astoma seselifolium* DC. | Umbelliferae | Astoma | Furgu' (SU)<br>Jawzat Al-Ard (RF) | Cormous herb | River Banks |
| 15. | *Atriplex halimus* L. | Chenopodiaceae | Orache | Kataf (SU) Hamth (BS) | herb | Marshes |
| 16. | *Beta vulgarisL*. Subsp. maritima (L.) Acrang | Chenopodiaceae | Wild Chard | Silq Barri (RF) | herb | Disturbed land |
| 17. | *Bongardia chrysogonum* L. | Berberidaceae | Bongardia | Eraift ed-dik (BS)<br>Rejil Al-hamameh (RF) | Cormous herb | Farmland |
| 18. | *Calamintha incana* (Sm.) Heldr. | Labiatae | Grey Moench | Za'tman (RF)<br>Krainieh (BS) | herb | Woodland |
| 19. | *Carlina curetum* Heldr.ex Hal. | Compositae | Carline Thistle | Kanafoush (SU)<br>Saq Al-Arous (RF) | herb | Marshes |
| 20. | *Carlina hispanica* Lam. | Compositae | Carline Thistle | Saq Al-Arous (RF) | herb | Marshes |
| 21. | *Carthamus tenuis* (Boiss.and Blanche) Bornm. | Compositae | Safflower | Kus (SU) | herb | Marshes |
| 22. | *Centaurea hyalolepis* Boiss | Compositae | Spanish Thistle | Murrar (RF) | herb | Marshes |
| 23. | *Centaurea iberica* Trev.ex Sprengel | Compositae | Spanish Thistle | Murrar (BS) | herb | Marshes |
| 24. | *Ceratonia siliqua* L. | Leguminosae | locust | Kharrub (RF) | tree | Disturbed land |
| 25. | *Chrysanthemum coronarium* L. | Compositae | Crown Daisy | Busbas (RF)<br>Basum (BS) | herb | Marshes |
| 26. | *Cichorium pumilum* Jacq. | Compositae | Dwarf Chicory | Hindiba (SU)<br>Ilt (BS) | herb | Marshes |
| 27. | *Coriandrum sativum* L.. | Umbelliferae | Coriander | Kuzbarah (SU) | herb | Farmland |
| 28. | *Crataegus aranica* (L.) Bose. Ex DC. | Rosaceae | Hawthorn | Za'rur (SU) | shrub | Forests |
| 29. | *Crataegus azarolus* L. | Rosaceae | Hawthorn | Za'rur (SU) | shrub | Forests |
| 30. | *Crocus aleppicus* Baker | Iridaceae | Crocus | Hlayyan (RF)<br>Shuhaim (BS) | Cormous herb | Woodland |
| 31. | *Crocus cancellatus* Herb. | Iridaceae | Crocus | Shuhhaim (SU) | Cormous herb | Disturbed land |
| 32. | *Crocus hermoneus* Kotschy ex Maw | Iridaceae | Crocus | Hlayyan (RF) | Cormous herb | Woodland |
| 33. | *Crocus moabiticus* Bornm.and Dinsm. | Iridaceae | Crocus | Shuhhaim (RF) | Cormous herb | Disturbed land |
| 34. | *Crocus pallasii* Gold | Iridaceae | Crocus | Shuhhaim (RF) | Cormous herb | Forest margins |
| 35. | *Cyclamen persicum* Miller | Primulaceae | Cyclamen | Za'matut (RF)<br>Karn Al-Ghazal (BS) | herb | Woodland |
| 36. | *Diplotaxis acris* (Forsskal) Boiss | Cruciferae | Rocket | Huwairreh (RF)<br>Yahaq (SU) | herb | Marshes |
| 37. | *Diplotaxis cricoids (*L.) DC | Cruciferae | White Wall-Rocket | Huwairreh (SU) | Herb | Disturbed land |
| 38. | *Eminium spiculatum* (Blume) Kuntze | Araceae | Eminium | Sumai'ah (BS)<br>Ja'deh (RF) | Cormous herb | Woodland |
| 39. | *Erodium gruinum* (L.) l'Her. | Geraniaceae | Stork's Bill | Ibrat Al A'Juz (SU) | herb | Disturbed land |
| 40. | *Eruca sativa* Miller | Cruciferae | Garden Rocket | Jarjeer (RF) | herb | Marshes |
| 41. | *Eryngium creticum* Lam | Umbelliferae | Button snake root | Kurs'nneh (RF) | herb | Farmland |
| 42. | *Eryngium glomeratum* Lam. | Umbelliferae | Button snake root | Kurs'nneh (BS) | herb | Farmland |
| 43. | *Foeniculum vulgare* Miller | Umbelliferae | Common fennel | Shumar (BS) | herb | Farmland |
| 44. | *Geranium tuberosum* L. | Geraniaceae | Crane's Bill | Karn Al Ghazal (SU)<br>Furku' Shishan (RF) | herb | Woodland |
| 45. | *Geropogon hybridus* (L.) Schulltz Bip | compositae | Tragopogon | Dhunaibah (BS)<br>Danab Al-Faras (SU) | herb | Farmland |
| 46. | *Glycyrrhiza glabra* L. | Leguminosae | liquorice | Sus (RF) | shrub | Forest margins |
| 47. | *Gundelia tournefortii* L. | Compositae | Gundelia | A'kkub (RF)<br>Ka'oub (SU) | herb | Farmland |
| 48. | *Lactuca orientalis* (Boiss.) Boiss. | Compositae | Orientle Lettuce | Khees (SU)<br>Rabhalah (RF) | herb | Farmland |
| 49. | *Lactuca tuberosa* Jacq. | Compositae | Wild Lettuce | Khass Barri (SU) | Herb | Farmland |
| 50. | *Lamium moschatum* Miller | Labiatae | Dead Nettle | Rkaibet al-jamal (SU) | herb | Woodland |
| 51. | *Lathyrus blepharicarpus* Boiss | Leguminosae | vetchling | Sa'ysa' (SU)<br>Khubz Al-Kak (BS) | herb | Forest margins |
| 52. | *Lathyrus cicer* L. | Leguminosae | Dwarf Chickling vetch | Asaysa' (SU) | herb | Disturbed land |
| 53. | *Lathyrus gorgonei* Parl. | Leguminosae | Sweet pea vetchling | Sa'ysa' (BS) | herb | Forest margins |

Table 1: Continued

| | | | | | | |
|---|---|---|---|---|---|---|
| 54. | *Lathyrus inconspicuus* | Leguminosae | Small flowered vetchling | Sa'ysa' (BS) | herb | Forest margins |
| 55. | *Lathyrus marmoratus* Boiss. and Blanche | Leguminosae | vetchling | Sa'ysa' (SU) | herb | Forest margins |
| 56. | *Lathyrus ochrus* (L.) DC | Leguminosae | Yellow pea | Sa'ysa' (SU) | herb | Disturbed land |
| 57. | *Lathyrus pseudocicera* Pamp. | Leguminosae | vetchling | Sa'ysa' (RF) | herb | Forest margins |
| 58. | *Lepidium aucheri* Boiss | Cruciferae | Cress, Rerpperwort | Rashad (SU) | herb | Farmland |
| 59. | *Lepidium latifolium* L. | Cruciferae | Dittander | Kharfak (SU) | herb | Farmland |
| 60. | *Lepidium sativum* L. | Cruciferae | Pepper cress | Kharfak (RF) | Herb | Farmland |
| 61. | *Malabaila secacul* (Miller) Boiss. | Umbelliferae | Hartwort | Jazar (RF) | herb | Farmland |
| 62. | *Malva neglecta* Wallr. | Malvaceae | Dwarf mallow | Khubbayzah (SU) | herb | Forest |
| 63. | *Malva nicaeenis* All. | Malvaceae | mallow | khubbayzah (SU) | herb | Forest |
| 64. | *Malva parviflora* L. | Malvaceae | mallow | khubbayzah (SU) | herb | Forest |
| 65. | *Malva syvestris* L. | Malvaceae | Common mallow | khubbayzah (RF) | herb | Forest margins |
| 66. | *Mandragora autumnalis* Bertol. | Solanaceae | Mandrake | Tufah majan (RF) | herb | Woodland |
| 67. | *Matricaria aurea* (Loefl.) Schultz Bip. | Compositae | Chamomile | Babunij (BS)<br>Qurai'a (SU) | herb | Disturbed land |
| 68. | *Medicago orbicularis* (L.) Bart. | Leguminosae | Flat podded medick | Khbs Al- Rai (RF) | herb | Forest margins |
| 69. | *Medicago sativa* L. | Leguminosae | Alfalfa | Kurta (RF) barsim hijazi (SU) | herb | Disturbed land |
| 70. | *Mentha longifolia* (L.) Hudson | Labiatae | Wild mint | Na'na Berri (SU) | herb | Forest margins |
| 71. | *Micromeria nervosa* (Desf.) Bentham | Labiatae | Benth | Shai berri (RF) | herb | Woodland |
| 72. | *Nasturtium officinale* R.Br. | Cruciferae | Water cress | Huwaireh (BS) | herb | Marshes |
| 73. | *Notobasis syriaca* (L.) Cass. | Compositae | Syrian Thistle | Khurfaish (BS) | herb | Disturbed land |
| 74. | *Onobrychis caput-galli* (L.) Lam. | Leguminosae | Cock's head | Dorrais (RF)<br>Kataief (SU) | herb | Disturbed land |
| 75. | *Onobrychis crista-galli* (L.) lam. | Leguminosae | Cock's comb | Dorrais (SU) | herb | Disturbed land |
| 76. | *Onobrychis squarrosa* Viv. | Leguminosae | Cock's head | Dorrais (BS) | herb | Disturbed land |
| 77. | *Ononis spinosa* L. | Leguminosae | restharrow | Shibrik (BS) | shrub | Woodland |
| 78. | *Opuntia ficus-barbarica* A. Berger | Cactaceae | Prickly pear | Sabr (RF)<br>Subbair (BS) | cactus | Disturbed land |
| 79. | *Origanum syriacum* L. | Labiatae | Thyme | Za'tar (SU) | herb | Woodland |
| 80. | *Paronychia argentea* Lam. | caryophyllaceae | Mountain knotgrass | Rijl al- Hamameh (RF)<br>Shuwaisht Al-Raii (BS) | herb | Disturbed land |
| 81. | *Pinus halepensis* Miller | Pinaceae | Aleppo pine | Snober halabi (RF)<br>Lizzab (BS) | tree | |
| 82. | *Pistacia atlantica* Desf. | Anacardiaceae | Pistacia | Botum (RF) | Tree | Forest |
| 83. | *Pistacia palaestina* Boiss | Anacardiaceae | Terebinth tree | Botum (RF)<br>Sarris (SU) | Tree | Forest |
| 84. | *Pisum fulvum* Sibth et Sm. | Leguminosae | Wild pea | Burraid (BS) | herb | Woodland |
| 85. | *Pisum fulvum (*Berg.) Lehm. | Leguminosae | Wild pea | Burraid (RF) | herb | Forest margins |
| 86. | *Pisum sativum* L. | Leguminosae | Wild pea | Tuggaish (RF) | herb | Woodland |
| 87. | *Portulaca oleracea* L. | Portulacaceae | Common purslane | Farfahaina (RF)<br>Bagleh (SU) | herb | Farmland |
| 88. | *Pulicaria incisa* (Lam.) DC. | Compositae | Fleabane | Shay Al-Jabal (RF) | herb | Disturbed land |
| 89. | *Pyrus syriaca* Boiss. | Rosaceae | Wild pear | Injas barri (BS) | shrub | Forests |
| 90. | *Quercus coccifera* L. | Fagaceae | Oak | Ballut (RF)<br>Sidian (SU) | tree | Woodland |
| 91. | *Quercus ithaburensis* Decne | Fagaceae | Oak | Mallul (SU) | tree | Woodland |
| 92. | *Ranunculus muricatus* L. | Ranunculaceae | Pile wort | Hwaireh (SU) | herb | Forest margins |
| 93. | *Rheum palaestinum* Feinbr. | Polygonaceae | Palestinian Rhubarb | Rabbas (BS)<br>Atrafan (SU) | herb | Forest |
| 94. | *Rhus coriaria* L. | Anacardiaceae | Sumach | Summaq (RF) | shrub | Forest |
| 95. | *Ridolfia segetum* (Guss.) Moris | Umbelliferae | Dill | Shabat (RF) | herb | Woodland |
| 96. | *Rubus canescens* DC. | Rosaceae | Bramble | U'llayk (BS) | shrub | River Banks |
| 97. | *Rubus sanguineus* Friv | Rosaceae | Bramble | U'llayk (SU) | shrub | River Banks |
| 98. | *Rumex crispus* L. | Polygonaceae | Yellow Dock | Hummaid (RF) | herb | Disturbed land |
| 99. | *Rumex cyprius* Mur. | Polygonaceae | Sorrel | Hummaid (BS) | herb | Farmland |
| 100. | *Rumex pulcher* L. | Polygonaceae | Fiddle Dock | Hummaid (SU) | herb | Farmland |
| 101. | *Rumex vesicarius* L. | Polygonaceae | Sorrel | Hamaimesah (BS) | herb | Forest margins |
| 102. | *Ruta chalepensis* L. | Rutaceae | Syrian rue | Faijan (BS) Sithab (SU) | shrub | Farmland |
| 103. | *Salvia dominica* L. | Labiatae | Dominica sage | Khuwaikah (SU)<br>Marrow (RF) | herb | Woodland |
| 104. | *Salvia fruticosa* Miller | Labiatae | Lebanon Sage | Mariamieah (RF) | herb | Disturbed land |
| 105. | *Salvia judaica* Boiss | Labiatae | Clary | Lisan Al-thawr (SU)<br>Lsaineh (BS) | herb | Woodland |
| 106. | *Sarcopoterium spinosum* (L.) Spach | Rosaceae | Thorny burnet | Natsh (SU) Ballan (RF) | shrub | Farmland |
| 107. | *Scolymus maculatus* L. | Compositae | Golden Thistle | Sinnariah (RF) | herb | Disturbed land |
| 108. | *Scorzonera judaica* Eig | Compositae | Viper's Grass | Ka'fur (RF) | herb | Farmland |
| 109. | *Scorzonera papposa* DC. | Compositae | Viper's Grass | Dhibbah (SU) | herb | Disturbed land |
| 110. | *Scorzonera schweinfurthi* Boiss | Compositae | Viper's Grass | Ka'fur (SU) Dhibbah (BS) | herb | Farmland |
| 111. | *Scorzonera syriaca* Boiss. | Compositae | Viper's Grass | Bagil (SU)<br>Dibbah (RF) | herb | Farmland |

Table 1: Continued

| | | | | | | |
|---|---|---|---|---|---|---|
| 112. | *Siapsis arvensis* L. | Cruciferae | Charlock | Liffaiteh (BS)<br>Offaiteh (SU) | herb | Disturbed land |
| 113. | *Silybum marianum* (L.) Gaertner | Compositae | Holy Thistle, milk Thistle | Khurfaish jimal (RF) | herb | Farmland |
| 114. | *Sinapsis alba* L. | Cruciferae | White Mustard | Khrdal Abiad (BS) | herb | Marshes |
| 115. | *Sisymbrium irio* L. | Cruciferae | Mustard Rocket | Kibs (RF) | Herb | Disturbed land |
| 116. | *Sonchus oleraceus* L. | Compositae | Sow Thistle | Ju'thaith (RF)<br>I'lk-Khail (BS) | herb | Disturbed land |
| 117. | *Taraxacum megalorrhizon* (Forsskal) Hand. | Compositae | Dandelion | Tarakhon (SU) | herb | Farmland |
| 118. | *Tetragonolobus palaestinus* Boiss. and Blanche | Leguminosae | Palestine winged pea | Jalathun (RF)<br>Asaiba'ah (SU) | herb | Woodland |
| 119. | *Thymus bovei* Bentham | Labiatae | Thyme | Za'tar farsi (SU) | herb | Forest margins |
| 120. | *Thymus capitatus* (L.) Hoffmans. and Link | Labiatae | Headed Thyme | Za'tar farsi (BS) | herb | Forest margins |
| 121. | *Tordylium aegyptiacum* (L.) Lam. | Umbelliferae | Egyptian hartwort | Draihmeh (SU) | herb | Farmland |
| 122. | *Tragopogon buphthalmoides* (DC.) Boiss | Compositae | Goat's Beard | Thibbah (BS)<br>Danab Al-Faras (RF) | herb | Farmland |
| 123. | *Tragopogon coelesyriacus* Boiss | Compositae | Goat's Beard | Thibbah (BS) | herb | Farmland |
| 124. | *Tragopogon collinus* DC | Compositae | Goat's Beard | Thibbah (BS) | herb | Farmland |
| 125. | *Trigonella arabica* Delile | Leguminosae | Wild Arabic fenugreek | Handagog (RF)<br>Hwajeh (SU) | herb | Woodland |
| 126. | *Trigonella berythea* Boiss. and Blache | Leguminosae | fenugreek | Handagog (RF)<br>Hwajeh (SU) | herb | Disturbed land |
| 127. | *Trigonella caelesyriaca* Boiss. | Leguminosae | fenugreek | Handagog (RF)<br>Hwajeh (SU) | herb | Woodland |
| 128. | *Trigonella foenum-graceum* L. | Leguminosae | fenugreek | Hilbah (BS) | herb | Woodland |
| 129. | *Trigonella kotschyi* Fenzl ex Boiss. | Leguminosae | Trigonel | Handagog (RF)<br>Hwajeh (SU) | herb | Woodland |
| 130. | *Trigonella schumbergeri* Boiss | Leguminosae | Trigonel | Hwajeh (BS) | herb | Forest margins |
| 131. | *Trigonella stellata* Forsskal | Leguminosae | Star fenugreek | Handagog (RF)<br>Hwajeh (SU) | herb | Forest |
| 132. | *Tulipa argensis* DC. | Liliaceae | Wild tulip | Kern al Ghazal (RF) | Cormous herb | Forest |
| 133. | *Tulipa systole* tapf | Liliaceae | Wild tulip | Kern al Ghazal (RF)<br>Zanbak (BS) | Cormous herb | Disturbed land |
| 134. | *Urtica pilulifera* L. | Urticaceae | Roman nettle | Gurrais (SU) | herb | Disturbed land |
| 135. | *Vicia hybrida* L. | Leguminosae | Tare vetch | Fowaileh (BS)<br>Biz Al-Bakara (SU) | herb | Disturbed land |
| 136. | *Vicia narbonensis* L. | Leguminosae | Narbone vetch | Ful iblis (SU) | herb | Forest |
| 137. | *Vicia peregrina* L. | Leguminosae | Broad podded vetch | Jlibban (SU)<br>Sin Al-Far (BS) | herb | Forest |
| 138. | *Vicia sativa* L. | Leguminosae | Common vetch | Jlibban (RF)<br>Ful rumi (BS) | herb | Forest |
| 139. | *Ziziphus lotus* (L.) Lam. | Rhamnaceae | Ziziphus | Sidir (SU) | shrub | Forest margins |
| 140. | *Ziziphus nummularia* Bunm.fil.) Wight and Walk | Rhamnaceae | Ziziphus | Rubbayd (RF) | shrub | Forest margins |
| 141. | *Ziziphus spina-christi* (L.) Will | Rhamnaceae | Christ thorn | Sidir (SU) Nabaq (BS) | shrub | Forest margins |
| 142. | *Ziziphus ziziphus* (L.) Medikle | Rhamnaceae | Jujube | I'nnab (RF) | shrub | Forest margins |

Table 2: List of some commonly used edible plants with their edible parts, edible forms, use reports and other uses

| No. | Scientific name | Part Used | Edible Form | Use Report % | Other uses |
|---|---|---|---|---|---|
| 1. | *Alcea setosa* (Boiss.) Alef | Hot water extract of the flowers | beverage | 62.40 | Me |
| 2. | *Allium ampeloprasum* L. | Whole young plant | raw | 40.00 | Me |
| 3. | *Ammi majus* L. | Young fleshy shoots | raw | 76.40 | Me |
| 4. | *Anchusa hybrida* Ten | nectar | Sucking as juice | 100.00 | Me |
| 5. | *Anchusa italica* Retz. | nectar | Sucking as juice | 100.00 | Me |
| 6. | *Ankyropetalum gypsophiloides* Fenzl | Water extract of stems and fleshy roots | Emulsifier in candy and halawa preparations | 45.60 | Me |
| 7. | *Apium graveolens* L. | Whole young plant | Raw or as a salad | 60.60 | Me |
| 8. | *Apium nodiflorum* (L.) Lag. | Whole young plant | Raw or as a salad and used in dough stuffing | | Me |
| 9. | *Arbutus andrachne* L. | Ripe fruits | raw | 76.90 | Me |
| 10. | *Arum dioscoridis* Sibth. and Kit. | Leaves | After boiling as a stew | 62.40 | Me |
| 11. | *Arum hygrophilum* Boiss | leaves | After boiling as a stew | 65.80 | Me |
| 12. | *Arum palaestinum* Boiss | leaves | After boiling as a stew | 75.40 | Me |
| 13. | *Asparagus aphyllus* L. | Fresh early growing young shoots | Vegetable dish or in soup | 76.90 | Fo |
| 14. | *Astoma seselifolium* DC. | Fresh corms | Raw or roasted | 62.80 | Fo |
| 15. | *Atriplex halimus* L. | Fresh leaves | Raw or cooked as a vegetable | 62.40 | Fo |
| 16. | *Beta vulgaris*L. Subsp. maritima (L.) Acrang | Fresh leaves and stems | Eaten cooked as a stew or as a soup mixed with lentil and in dough stuffing (sambosak) | 55.60 | Fo |
| 17. | *Bongardia chrysogonum* L. | Fresh leaves | Raw or as a salad | 70.00 | Me |
| 18. | *Calamintha incana* (Sm.) Heldr. | Fresh and dried leaves and shoots | Raw or used for seasoning and as a tea | 54.65 | Me |
| 19. | *Carlina curetum* Heldr.ex Hal. | Young stems after removing leaves | Raw. | 62.40 | Me |
| 20. | *Carlina hispanica* Lam. | Young stems after removing leaves | Raw. | 62.40 | Fo |
| 21. | *Carthamus tenuis* (Boiss.and Blanche) Bornm. | Fleshy leaf petioles and young stems after removing leaves | raw | 44.75 | Fo |

Table 2: Continued

| | | | | | |
|---|---|---|---|---|---|
| 22. | *Centaurea hyalolepis* Boiss | Fleshy leaf petioles and young stems after removing leaves | raw | 54.65 | Me |
| 23. | *Centaurea iberica* Trev.ex Sprengel | Fleshy leaf petioles and young stems after removing leaves | raw | 100.00 | Me |
| 24. | *Ceratonia siliqua* L. | dried fruits (pods,legumes) | Dried ripe as raw, unripe as milk coagulant. | 76.90 | Fo |
| 25. | *Chrysanthemum coronarium* L. | Young stems after removing leaves | Raw | 100.00 | Me |
| 26. | *Cichorium pumilum* Jacq. | Young leaves | Salad or cooked as a vegetable dish | 55.30 | Me |
| 27. | *Coriandrum sativum* L.. | Fresh young shoots and leaves | Raw or as a salad and food flavouring | 100.00 | Me |
| 28. | *Crataegus aranica* (L.) Bose. Ex DC. | Fresh ripe fruits | raw | 54.90 | Fw |
| 29. | *Crataegus azarolus* L. | Fresh ripe fruits | raw | 100.00 | Me |
| 30. | *Crocus aleppicus* Baker | Corms and soft seeds | Raw and as roasted corms | 89.50 | Me |
| 31. | Crocus cancellatus Herb. | Corms and soft seeds | Raw and as roasted corms | 62.40 | Fo |
| 32. | *Crocus hermoneus* Kotschy ex Maw | Corms and soft seeds | Raw and as roasted corms | 31.50 | Fo |
| 33. | *Crocus moabiticus* Bornm.and Dinsm. | corms | Raw and as roasted corms | 85.70 | Fo |
| 34. | *Crocus pallasii* Gold | corms | Raw and as roasted corms | 31.50 | Me |
| 35. | *Cyclamen persicum* Miller | Fresh leaves and soft seeds | Raw, cooked or used in dough stuffing | 100.00 | Me |
| 36. | *Diplotaxis acris* (Forsskal) Boiss | leaves | Raw and as a salad | 34.70 | Fo |
| 37. | *Diplotaxis cricoids* (L.) DC | Young stems and leaves | Raw or as a salad | 66.80 | Fo |
| 38. | *Eminium spiculatum* (Blume) Kuntze | leaves | After boiling as a stew | 80.25 | Me |
| 39. | Erodium gruinum (L.) l'Her. | Young fruits (schizocarp | raw | 54.65 | Fo |
| 40. | *Eruca sativa* Miller | Leaves and young stems | Raw or as a salad | 76.90 | Me |
| 41. | *Eryngium creticum* Lam | Fresh young shoots and leaves | Raw or in salad | 64.30 | Me |
| 42. | *Eryngium glomeratum* Lam. | young shoots and leaves | raw | 100.00 | Me |
| 43. | *Foeniculum vulgare* Miller | Fresh shoots and leaves | Raw and for seasoning | 92.20 | Me |
| 44. | *Geranium tuberosum* L. | tubers | Raw or roasted | 33.60 | Fo |
| 45. | *Geropogon hybridus* (L.) Schulltz Bip | Whole young plant | raw | 62.40 | Me |
| 46. | *Glycyrrhiza glabra* L. | Water extract of dried roots | Cold beverage | 62.40 | Fo |
| 47. | *Gundelia tournefortii* L. | Young stems and heads | Cooked as a stew or egg-vegetable dish | 43.25 | Fo |
| 48. | Lactuca orientalis (Boiss.) Boiss. | Whole young plant | raw | 76.90 | Me |
| 49. | *Lactuca tuberosa* Jacq. | Whole young plant | raw | 100.00 | Fo |
| 50. | *Lamium moschatum* Miller | Young stems | raw | 85.90 | Fo |
| 51. | *Lathyrus blepharicarpus* Boiss | Soft fruits and young shoots | raw | 54.65 | Fo |
| 52. | *Lathyrus cicer* L. | Fresh soft fruits | raw | 44.60 | Fo |
| 53. | Lathyrus gorgonei Parl. | Fresh soft fruits | raw | 62.40 | Fo |
| 54. | *Lathyrus inconspicuus* | Fresh soft fruits | raw | 44.30 | Fo |
| 55. | *Lathyrus marmoratus* Boiss. and Blanche | Fresh soft fruits | raw | 95.20 | Fo |
| 56. | *Lathyrus ochrus* (L.) DC | Fresh soft fruits | raw | | Fo |
| 57. | *Lathyrus pseudocicera* Pamp. | Fresh soft fruits | raw | 62.40 | Fo |
| 58. | *Lepidium aucheri* Boiss | Leaves and young stems | Raw or as a salad | 100.00 | Fo |
| 59. | Lepidium latifolium L. | Young leaves | Salad mixed with yoghort | 88.30 | Fo |
| 60. | *Lepidium sativum* L. | Leaves and young stems | Salad mixed with yoghort | 62.40 | Fo |
| 61. | *Malabaila secacul* (Miller) Boiss. | Fresh fleshy roots and immature green schizocarp | raw | 91.10 | Fo |
| 62. | *Malva neglecta* Wallr. | Fresh leaves and young shoots | Cooked vegetable dish | 100.00 | Me |
| 63. | *Malva nicaeenis* All. | Fresh leaves | Cooked vegetable dish | 76.90 | Me |
| 64. | *Malva parviflora* L. | Fresh leaves and young shoots | Cooked vegetable dish | 76.90 | Me |
| 65. | *Malva syvestris* L. | Fresh leaves and young shoots | Cooked vegetable dish | 100.00 | Me |
| 66. | Mandragora autumnalis Bertol. | Ripe fruits | Raw without the seeds | 100.00 | Me |
| 67. | *Matricaria aurea* (Loefl.) Schultz Bip. | Infusion of whole plant | Hot beverage | 54.65 | Me |
| 68. | *Medicago orbicularis* (L.) Bart. | Fresh soft fruits | raw | 54.65 | Fo |
| 69. | *Medicago sativa* L. | Young shoots | raw | 100.00 | Fo |
| 70. | *Mentha longifolia* (L.) Hudson | Fresh and dried stems and leaves | Salad or for dough stuffing and seasoning | 62.40 | Me |
| 71. | *Micromeria nervosa* (Desf.) Bentham | Hot extract of dried stems and leaves | beverage | 32.80 | Fo |
| 72. | *Nasturtium officinale* R.Br. | Whole young plant | Raw and as a salad mixed with yoghort | 54.65 | Me |
| 73. | *Notobasis syriaca* (L.) Cass. | Young leaves, stems and heads | Raw or cooked as a stew | 54.65 | Me |
| 74. | *Onobrychis caput-galli* (L.) Lam. | Fresh soft fruits | raw | 76.90 | Me |
| 75. | *Onobrychis crista-galli* (L.) lam. | Fresh soft fruits | raw | 62.40 | Me |
| 76. | *Onobrychis squarrosa* Viv. | Fresh soft fruits | raw | 54.90 | Fo |
| 77. | *Ononis spinosa* L. | Young fresh shoots | raw | 45.50 | Me |
| 78. | *Opuntia ficus-barbarica* A. Berger | fruits | Raw after peeling | 100.00 | Me |
| 79. | *Origanum syriacum* L. | Fresh or dried young stems and leaves | Fresh as Salad seasoning and dough stuffing. Dry as ingredient in thyme mix. | 85.70 | Me |
| 80. | *Paronychia argentea* Lam. | Whole young plant | raw | 100.00 | Me |
| 81. | *Pinus halepensis* Miller | Young male cones and mature seeds | Raw or mixed with some sweets | 62.40 | Fw |
| 82. | *Pistacia atlantica* Desf. | Fresh young leaves | Raw or as a Salad mixed with youghort | 56.00 | Me,Fw |
| 83. | *Pistacia palaestina* Boiss | Fresh young leaves | Raw or as a Salad mixed with youghort | 58.00 | Me,Fw |
| 84. | *Pisum fulvum* Sibth et Sm. | Fresh soft fruits and young shoots | raw | 62.40 | Fo |
| 85. | *Pisum fulvum* (Berg.) Lehm. | Fresh soft fruits and young shoots | raw | 100.00 | Fo |
| 86. | *Pisum sativum* L. | Fresh soft fruits and young shoots | raw | 32.80 | Fo |

Table 2: Continued

| | | | | | |
|---|---|---|---|---|---|
| 87. | *Portulaca oleracea* L. | Fresh young shoots and leaves | Raw and as a salad | 76.80 | Me |
| 88. | *Pulicaria incisa* (Lam.) DC. | Infusion of leaves and shoots | Hot beverage | 66.80 | Fo |
| 89. | *Pyrus syriaca* Boiss. | Fresh ripe fruits | raw | 40.00 | Fo |
| 90. | *Quercus coccifera* L. | Mature nuts | roasted | 85.80 | Fw,Me |
| 91. | *Quercus ithaburensis* Decne | Mature nut | roasted | 100.00 | Fw,Me |
| 92. | *Ranunculus muricatus* L. | Fresh young shoots | Raw, salad or cooked as vegetable dish | 83.40 | Me |
| 93. | *Rheum palaestinum* Feinbr. | Stems and leaf petioles | Raw or boiled | 98.90 | Fo |
| 94. | *Rhus coriaria* L. | Seeds and seed coats | Spice and seasoning | 60.00 | Fw |
| 95. | *Ridolfia segetum* (Guss.) Moris | Leaves and young shoots | Raw or used in soup flavouring | 100.00 | Fo |
| 96. | *Rubus canescens* DC. | Fresh ripe fruits | Raw or as a jam and unripe fruits are used in dough stuffing | 65.80 | Me |
| 97. | *Rubus sanguineus* Friv | Fresh ripe fruits | Raw or as a jam and unripe fruits are used in dough stuffing | 54.90 | Me |
| 98. | *Rumex crispus* L. | Leaves and young shoots | Raw, cooked or used in dough stuffing | 100.00 | Fo |
| 99. | *Rumex cyprius* Mur. | Whole young plant | Raw, cooked or used in dough stuffing | 76.90 | Fo |
| 100. | *Rumex pulcher* L. | Leaves and young shoots | Raw, cooked or used in dough stuffing | 45.60 | Fo |
| 101. | *Rumex vesicarius* L. | Whole young plant | Raw, cooked or used in dough stuffing | 63.70 | Fo |
| 102. | *Ruta chalepensis* L. | shoots | Pickled with green olives, mixed as flavour to margarine | 64.60 | Me |
| 103. | *Salvia dominica* L. | Young stems and fleshy stem galls | raw | 76.90 | Me |
| 104. | *Salvia fruticosa* Miller | Hot water extract of fresh or dried leaves and shoots | Hot beverage | 80.00 | Me |
| 105. | *Salvia judaica* Boiss | Fresh leaves | Stuffed and cooked | 62.40 | Me |
| 106. | *Sarcopoterium spinosum* (L.) Spach | Fresh soft fruits | raw | 76.90 | Me |
| 107. | *Scolymus maculatus* L. | Young stems | raw | 54.65 | Me |
| 108. | *Scorzonera judaica* Eig | Whole plant | raw | 90.50 | Fo |
| 109. | *Scorzonera papposa* DC. | Whole plant | raw | 76.90 | Me |
| 110. | *Scorzonera schweinfurthi* Boiss | Whole plant | raw | 100.00 | Fo |
| 111. | *Scorzonera syriaca* Boiss. | Whole plant | raw | 97.90 | Fo |
| 112. | *Siapsis arvensis* L. | Young stems and leaves | raw | 100.00 | Me |
| 113. | *Silybum marianum* (L.) Gaertner | Young leaves, stems and heads | Raw or cooked as a stew | 54.65 | Me |
| 114. | *Sinapsis alba* L. | Young stems and leaves | Raw as a salad mixed with yoghort | 87.60 | Fo |
| 115. | *Sisymbrium irio* L. | Young stems and leaves | Raw or as a salad mixed with yoghort | 54.65 | Fo |
| 116. | *Sonchus oleraceus* L. | Fleshy young stems | raw | 54.65 | Me |
| 117. | *Taraxacum megalorrhizon* (Forsskal) Hand. | leaves | raw | 100.00 | Me |
| 118. | *Tetragonolobus palaestinus* Boiss. and Blanche | Young and mature pods | Raw and boiled | 54.65 | Fo |
| 119. | *Thymus bovei* Bentham | Fresh, dried leaves and shoots | Fresh as Salad seasoning and dough stuffing. Dry as ingredient in thyme mix | 54.65 | Me |
| 120. | *Thymus capitatus* (L.) Hoffmans. and Link | Fresh or dried leaves and shoots | Fresh as Salad seasoning and dough stuffing. Dry as ingredient in thyme mix | 95.80 | Me |
| 121. | *Tordylium aegyptiacum* (L.) Lam. | Immature soft fruits | raw | 95.90 | Me |
| 122. | *Tragopogon buphthalmoides* (DC.) Boiss | Whole young plant | raw | 54.90 | Me |
| 123. | *Tragopogon coelesyriacus* Boiss | Whole yonng plant | raw | 62.40 | Me |
| 124. | *Tragopogon collinus* DC | Whole young plant | raw | 80.70 | Fo |
| 125. | *Trigonella arabica* Delile | Fresh young shoots | seasoning | 33.60 | Fo |
| 126. | *Trigonella berythea* Boiss. and Blache | Soft fresh pods and young shoots | seasoning | 100.00 | Fo |
| 127. | *Trigonella caelesyriaca* Boiss. | Fresh young shoots | seasoning | 62.40 | Fo |
| 128. | *Trigonella foenum-graceum* L. | Soft fresh pods and young shoots | Raw and use in dough stuffing | 42.10 | Fo |
| 129. | *Trigonella kotschyi* Fenzl ex Boiss. | Fresh young shoots | seasoning | 48.70 | Fo |
| 130. | *Trigonella schumbergeri* Boiss | Fresh young shoots | seasoning | 62.40 | Fo |
| 131. | *Trigonella stellata* Forsskal | Fresh young shoots | seasoning | 76.90 | Fo |
| 132. | *Tulipa argensis* DC. | corms | Raw and roasted | 100.00 | Me |
| 133. | *Tulipa systole* tapf | corms | Raw and roasted | 76.90 | Me |
| 134. | *Urtica pilulifera* L. | Fresh young shoots | raw | 87.90 | Me |
| 135. | *Vicia hybrida* L. | Fresh pods | raw | 100.00 | Fo |
| 136. | *Vicia narbonensis* L. | Fresh pods | raw | 54.65 | Fo |
| 137. | *Vicia peregrina* L. | Fresh pods | raw | 76.90 | Fo |
| 138. | *Vicia sativa* L. | Soft fresh pods | raw | 62.40 | Fo |
| 139. | *Ziziphus lotus* (L.) Lam. | Fresh and dry ripe fruits | raw | 100.00 | Fw |
| 140. | *Ziziphus nummularia* Bunm.fil.) Wight and Walk | Fresh and dry ripe fruits | raw | 64.90 | Fw |
| 141. | *Ziziphus spina-christi* (L.) Will | Fresh and dry ripe fruits | raw | 66.00 | Fw |
| 142. | *Ziziphus ziziphus* (L.) Medikle | Fresh and dry ripe fruits | raw | 60.30 | Fw |

Me: Medicinal Fw: Fire wood Fo: forage

*Lactuca tuberosa* Jacq., *Matricaria aurea* (Loefl.) Schultz Bip., *Origanum syriacum* L., *Thymus bovei* Bentham, *Thymus capitatus* (L.) Hoffmans. and Link, *Trigonella arabica* Delile, *Trigonella kotschyi* Fenzl ex Boiss. are threatened because of over use in times of crop shortages in Jordan. The Beduine shepherds' people, on the other hand, inhabits a more isolated district and has no ecological niche overlap with the other two social groups. Thus, such competition could not exist.

Most of the edible fruits and seeds are collected and immediately used by children such as *Crataegus aranica* (L.)Bose. Ex DC., *Diplotaxis cricoids*(L.)DC, *Onobrychis crista-galli*(L.)lam. *Pinus halepensis* Miller, *Pistacia atlantica* Desf., *Rubus canescens* DC., *Sarcopoterium spinosum* (L.)Spach, *Siapsis arvensis* L., *Trigonella foenum-graceum* L.,S *Ziziphus spina-christi* (L.)Will. such foraging activities provide essential supplies of vitamins and minerals particularly to children. Regarding collection and use of the edible plants, On the other hand, collection and preparation of leafy edibles such as *Arum dioscoridis* Sibth. and Kit. *Carthamus tenuis*(Boiss.and Blanche)Bornm, *Eryngium creticum* Lam *Gundelia tournefortii* L., *Malva neglecta* Wallr., *Malva syvestris* L., *Portulaca oleracea* L. are limited to women and young girls. The dishes prepared from these leafy edibles are however, consumed by all groups of the population. However, the local people appreciate some edible plants over the other in their utilization. For example, in northern areas, *Malva* species are preferred over the other leafy edibles. Similarly. The reasons for appreciation of one species over the other, as said by most informants were easiness to process, nutritional value and taste during consumption [1-3].

The time and frequency of harvesting varies from plant to plant depending on the availability of edible plants/parts, which in turn vary from place to place due to ecological and climatic conditions. For example, the bulbous species such as *Allium ampeloprasum* L., *Arum hygrophilum* Boiss, *Arum palaestinum* Boiss, *Arum dioscoridis* Sibth. and Kit., *Bongardia chrysogonum* L., *Crocus aleppicus* Baker, *Crocus cancellatus* Herb, *Crocus hermoneus* Kotschy ex Maw, *Crocus moabiticus* Bornm.and Dinsm., produce edible parts between november and january are best collected for consumption within 1–2 months time. On the other hand, some weedy vegetables such as *Carlina hispanica* Lam., *Carthamus tenuis*(Boiss.and Blanche)Bornm., *Cichorium pumilum* Jacq., *Eruca sativa* Miller, Eryngium creticum Lam, Eryngium glomeratum Lam., *Foeniculum vulgare* Miller, *Glycyrrhiza glabra* L., *Lactuca orientalis* (Boiss.) Boiss., *Lactuca tuberosa* Jacq., *Lathyrus blepharicarpus* Boiss, *Lathyrus cicer* L., *Lathyrus gorgonei* Parl., *Lathyrus inconspicuous* L., *Lathyrus marmoratus* Boiss. and Blanche, *Lathyrus ochrus*(L.)DC, *Lathyrus pseudocicera* Pamp., *Malva neglecta* Wallr., *Malva nicaeenis* All., *Malva parviflora* L., *Malva syvestris* L., *Nasturtium officinale* R.Br., *Pistacia atlantica* Desf. *Pisum fulvum* Sibth et Sm.,, *Pisum fulvum*(Berg.)Lehm., *Pisum sativum* L., *Portulaca oleracea* L., *Rhus coriaria* L., *Rumex crispus* L., *Rumex cyprius* Mur, *Rumex pulcher* L., *Rumex vesicarius* L., *Urtica pilulifera* L., *Vicia sativa* L. are available only on seasonal basis. In other words, they are available mainly during the rainy season between January and march but harvesting depends on availability of food in stock. Some times these weedy species are also available in irrigated fields even during dry season [1-3].

The edible parts are used as cabbage, raw, or in salad, fresh fruit or fruit juice, hot drink, boiled or roasted grain and tuber (Table 2). Analysis of the results indicates that nearly 85% of the recorded edible species or their parts are consumed fresh with out further processing and most of them are fruits and seeds. Fruits of some species are also used to make juice. Very few species are used as roasted/boiled grain or as hot drinks (as coffee and tea substitutes). For example, hot water extract of the flowers of *Alcea setosa* (Boiss)Alef used as beverage, whole young plant of *Allium ampeloprasum* L. eaten as raw, nectar of *Anchusa italica* Retz. sucking as juice, leaves of *Arum* plants as a stew after boiling, young leaves of *Cichorium pumilum* Jacq as salad or cooked as a vegetable dish, corms and soft seeds of *Crocus* plants roasted on iron plate; pounded and then boiled in clay pot for use as hot tea to reduce the feeling of starvation (Table 2). Most of the leafy edibles are however, consumed fresh or raw, after being prepared in salad mixed with youghurt, or after being boiled or cooked as in many cases like what has been appointed at in Table 2.

In addition to food value, the identified species are marketable and provide the opportunity to supplement household income. A study has shown that lower returns from farm necessitate the diversification of incomes from the sale of wild resources. This is truly observed in the study areas where various wild edible plants were sold at local market. Of the recorded species, more than 10% are marketed as edible fruit or leaves at local market. In general, income derived from the sale of wild plant species is of particular importance to the poorer households who must supplement food production with cash in order to meet basic needs [1-3, 16, 17].

Especially after return phenomenon to the nature and natural resources shown here in Jordan, most of the wild edible plants recorded in this study are edible both in normal times and during food shortage. Famine foods are used only when preferred alternatives are not available and in situations where chronic food shortages prevail. On the other hand, although most of the famine edible species are useful in periods of food shortage, some of them contain substances that incite harmful reaction resulting in illness when ingested by humans or animals.

Table 3: Comparative percentage of general utility of wild edible plants among the study community groups, rural farmers (RF) , Beduine shepherds (BS) and Semi urban (SU) f values obtained

| Community groups | Edible | Medicinal | Fire wood | forage | Row total | Chi-square |
|---|---|---|---|---|---|---|
| RF | 44.63 | 40.58 | 77.78 | 14.60 | 177.59 | $X^2$ = ns |
| BS | 34.50 | 43.47 | 22.23 | 36.80 | 137.00 | |
| SU | 49.30 | 47.83 | 66.67 | 12.70 | 176.50 | |
| Column total | 128.43 | 131.88 | 166.68 | 64.10 | 491.09 | |
| F values obtained | | | | | | |
| Community groups | Edible | Medicinal | Fire wood | forage | Row total | |
| RF | 46.45 | 47.70 | 60.29 | 23.18 | 177.62 | |
| BS | 35.83 | 36.80 | 46.51 | 17.89 | 137.03 | |
| SU | 46.17 | 47.41 | 59.92 | 23.04 | 176.54 | |
| Column total | 128.45 | 131.91 | 166.72 | 64.11 | 491.09 | |

DF = 6

Á = 0.05

$X^2$ from tables = 12.592

$X^2$ calculated is much less than $X^2$ from tables

$H_0$ is accepted

We conclude: the percentage of general utility of wild edible plants among the study community groups was not different and was approximately the same.

ns: no significant difference.

In Ajlun and Tafileh areas, for example, informants reported that *Alcea setosa* (Boiss.)Alef and *Arum* species cause anemia, body weakness, skin irritation and cardiac disturbances when consumed in larger quantity and/or for extended period. Similarly, *Beta vulgaris* L. causes stomach troubles, *Bongardia chrysogonum* L. causes pyretic symptoms, *Eminium spiculatum* (Blume)Kuntze causes intestinal troubles, *Pisum* species causes meningitis and neuralgic pains, *Quercus* species considered as stringent and causes gastroenteritis, *Ranunculus muricatus* L. causes spasmodic and diarhoea, *Rumex* as dysenteric and causes gastric pains, *Ruta chalepensis* L. causes abortion, sterility and dizziness, *Taraxacum* species causes sever headache while *Tulipa* causes respiratory troubles when consumed continuously [1-3, 16, 17].

Table 1 and 2 present the more prominent edible species consumed during food shortages in the study areas. Most of these edible plants are weedy and often used as leafy vegetables during food shortages. Consumption of vegetal matter from wild plants has more regularity and higher intake proportion in times of food shortages. The edibility information of these species was largely obtained from the low-income group. Nevertheless, with the advent of relief aid through food for work program, the use of some wild edible plants is diminishing.

The reduced utilization of these species may gradually lead to the fading away of indigenous knowledge associated with the species and thus poses danger on poorer people who have relied on these cheap and relatively easily accessible food plants. Hence, efforts should be made to promote the uses of these wild edibles through genetic and nutritional studies and developing appropriate processing methods. To this end, ethnobotanical knowledge is an important entry point and basic pragmatic information for further research on and development of these wild edibles (24-30).

The analysis of use diversity showed that the recorded edibles species provide more than 10 different uses to local communities. About 85%of the species are used for more than one use categories. Although some species have multiple uses, the average number of uses per species is three. The uses were placed under four major use categories (Table 3) which had highest (79%) contribution of the total uses. These include food as edible, medicinal, fuel wood and forage for animals. Minor uses were categorized as miscellaneous since their contribution to the total uses is very small compared to others. Percentage of general utility of the plants among the study communities was evaluated using Chi-square ($X^2$) test of homogeneity. The $X^2$ values ($X^2$ from tables= 12.592; df = 6; " = 0.05 while $X^2$ calculated is much less than what was obtained from the tables) indicated that the number of species reported as useful by the three communities under various use categories does not vary greatly implying that these uses are the common services obtained from wild edible plants in the study areas (for more details Table 3).

Table 4: Results of pair wise ranking of factors considered as threats to wild edible plants

| | Respondents | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Factors | RF1* | RF2 | RF3 | RF4 | BS1* | BS2 | BS3 | BS4 | SU1* | SU2 | SU3 | SU4 | T* | R* |
| Agricultural Expansion | 3 | 4 | 2 | 0 | 1 | 1 | 4 | 3 | 1 | 2 | 1 | 4 | 26 | 3 |
| Fire | 4 | 4 | 0 | 2 | 1 | 2 | 1 | 1 | 2 | 1 | 2 | 1 | 21 | 5 |
| Fuel wood collection | 2 | 1 | 2 | 4 | 4 | 4 | 3 | 2 | 2 | 2 | 0 | 2 | 28 | 2 |
| Over- stocking/Grazing | 4 | 3 | 4 | 3 | 0 | 1 | 1 | 4 | 1 | 3 | 3 | 3 | 30 | 1 |
| Selective harvesting | 1 | 4 | 3 | 2 | 1 | 1 | 0 | 4 | 1 | 0 | 3 | 2 | 22 | 4 |

NB: * (RF: Rural farmers, BS:beduine shepherds, SU: semiurban, T*: Total, R*: Rank) . The scores in the table are the value obtained from 12 key informants at four subsites from each community group.

The informants of different communities rated over-stocking /grazing as the principal threat to wild plant species (Table 4). This is mainly due to increasing demand for arable land by the burgeoning human population. Other activities ranked second with was fuel wood collection in studied areas. Informants also reported the agricultural expansion, selective harvesting and fire as the third, forth and the fifth gradual important factors affecting wild edible plants negatively.

The reduction of grazing land due to agricultural expansion has possibly resulted in overstocking in this area. Similarly, the informants claimed fuel wood collection as much important factor as agricultural expansion in threatening wild plants including edible species. Uncontrolled fire setting was another important threat to wild plants in Ajlun and Tafileh districts. However, nowadays, some individuals set fire to expand agricultural land while many of these cases occurred randomly due to careless activities. It was observed that many woody species were severely affected by such fires where the tree and shrub stands declined, some even completely burned, others dried and collected as firewood, even the newly grown vegetative parts of woody species were further over browsed and trampled by livestock causing considerable damage to the species. The over exploitation pressure on the wild edible species put some species as endangered and among the top considered for conservation in studied areas.

The habitat distribution of the surveyed wild edibles was found diverse ranging from low to high land altitudes. The vegetation formation or habitat types of these wild edibles were forest, wooded grass/bush land, spring banks and farmland/abandoned field. The study revealed that most (62.1%) of the edible species were collected from lowland wooded grassland or bush land. These species were mainly fruit and seed bearing plants. Other edible species recorded in this study were distributed in farm field/farm border and abandoned fields. Most of these species are weedy and have a broad range of altitudinal distribution (800-1400 m). They become abundant after short rain. Their ability to grow fast and harvestable within short periods makes them useful in sustaining nutritional requirements in periods of food shortage.

In addition to the wild edibles, some economically useful plants, which are domesticated but still found in the wild, were encountered in studied districts. These include *Crocus aleppicus* Baker, *Crocus cancellatus* Herb, *Crocus hermoneus* Kotschy ex Maw, *Crocus moabiticus* Bornm.and Dinsm *Crocus pallasii* Gold, *Foeniculum vulgare* Miller, *Glycyrrhiza glabra* L., *Matricaria aurea* (Loefl.) Schultz Bip, *Nasturtium officinale* R.Br., *Origanum syriacum* L., *Pinus halepensis* Miller, *Pistacia atlantica* Desf., *Pistacia palaestina* Boiss, *Rhus coriaria* L., *Rubus canescens* DC., *Rubus sanguineus* Friv, *Ruta chalepensis* L., *Tulipa argensis* DC. The distribution of these species in the wild is narrowly restricted to far distant patchy forests.

Wild edible plants are facing threats in their natural habitats from various human activities. The level of impacts of these activities varies from place to place. To understand local people's perception on the activities/factors more threatening wild edible plant species, pair wise ranking of five factors (overstocking/over grazing, selective cutting for construction and technology, agricultural land expansion, fuel wood collection and uncontrolled fire setting) were conducted. Ten possible pairs were obtained from N (N-1)/2 relations for pair wise ranking, where N is the number of factors.

As to the conservation status, most of the wild species in the areas have no protection. Especially the low land vegetation, which is the potential source of wild edibles, is now shrinking. Nevertheless, very few economic tree, shrub and herb species are now managed by some farmers in their farmland as agroforestry tree

and/or garden tree or herb. This shows that such management of and acquisition of economic benefits from species might promote local peoples' interest in conservation and maintenance of such locally important and endangered species and this is why recently two wild reserves were initiated in these destricts, Ajlun wild reserve in northern part of Jordan and Dana wild reserve (Tafileh) in southern part of Jordan.

## CONCLUSION

The preservation of the knowledge resulted from this study about the edibility, habitat distribution, harvesting time and uses of most wild edible plant species is still maintained among the study communities, appears to be the result of continued reliance of local communities on the wild edible plants both during normal and difficult times and most of the edible plants are used mainly by children and poor families. The higher increasing in the general utilities of the wild edible plants ensure the maintenance of indigenous knowledge associated with the species. Side by side, the decline in use of some famine edible species may gradually lead to the fading away of the indigenous knowledge associated with the plants. The results also revealed that many wild species as well as the green vegetational cover are under growing pressures from various anthropogenic factors. Thus, public awareness and community based management need to be encouraged at all levels alongside of urgent collection of germplasm to initiate what is similar to national seed bank The findings suggest further investigation into nutritional profiles and processing methods of all the species reported and study of the pharmacological properties for the therapeutic species since they are also used for medicinal applications.

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