RESEARCH PAPER

Ethnobotanical study of some wild edible plants in Hujran Basin, Kurdistan Region of Iraq

Ali M.K. Galalaey1,2,3, Mustafa A. Shaban1, Khadijah M.A. Rasul1&2, Darwesh Tahir Darwesh4, Alper UZUN5, Sami M.A. Youssef6&7, M. Hakkı Alma8

1College of Agriculture, University of Salahaddin-Erbil, Ministry of Higher education and scientific research, Kurdistan Region Government KRG, Iraq
2Department of Bioengineering and Sciences, Graduate School of Natural and Applied Sciences, Kahramanmaras Sütçü İmam University, Turkey.
3Haji Omaran Quarantine, Ministry of Agriculture and Water Resources, Kurdistan region government KRG-Iraq
4AMAP (botAny and Modelling of Plant Architecture and vegetation), University of Montpellier / CIRAD / CNRS / INRA / IRD – AMAP, CIRAD TA ASI/PS2, 34398 Montpellier cedex 5, France.
5Department of Recreation and Ecotourism, College of Agricultural Engineering Sciences, University of Duhok, Ministry of Higher education and scientific research, Kurdistan Region Government KRG, Iraq.
6&7Department of Forest Industry Engineering, Faculty of Forestry, Kahramanmaras Sütçü İmam University, Turkey.
8Faculty of Forestry, Kahramanmaras Sütçü İmam University, Kahramanmaras, TURKEY

ABSTRACT:

Ethnobotany is a cross-disciplinary science at the confluence of the natural sciences, social economics and ecological studies, all within political and society framework. Ethnobotanical activities are an important component in the natural resources and ecosystem services, and play a key role in the human life development. In this context, the traditional knowledge has always been transferred from generation to generation throughout the natural course of everyday life, and in most cases is not written down anywhere. The present study was carried out during seasons (spring, summer, and fall) at (2018), in order to investigate and record the local traditional knowledge about the wild plants used in the food and medicine of Erbil Hujran Basin and its surroundings, Because of that Hujran Basin locate inside the Zagros area. The site study is located to the right of the main Salahaddin-Shaqlawa road, around 40 km far from the Erbil city and surrounded by Sefin Mountain and Hujran hills. Here This study involved interviews of 68 individuals, those with, maximum possible divers age, education level and gender categories to cover the traditional knowledge of the wild edible plants uses in this Basin area. Interestingly, a wide variety of plant species (87), belong to genera (67), families (25), used as wild edibles in Hujran area. The most dominant plant families were Fabaceae (13 taxa), Asteraceae (12 taxa), Brassicaceae and Rosaceae 10 taxa). For all these wild edible plant species, we have provided there scientific and local names, frequency occurrences, part used, purposes use. Of these total plant species, 66 were herbaceous species while only 12 and 9 were shrubs and trees, respectively. Overall, these wild edible plants were harvested according to different part uses and stages (seedling stage, leaves, shoot, fruit, flowers, bulbs, gum). The most striking result to emerge from the data is that the wild edible plants were found to be used for various purposes (Dolma, spice, salad, boiled and fried with egg, jam, eaten raw, etc.). The findings of this research study have important implications for developing a global biological conservation strategy to preserve simultaneously the remarkable biodiversity and ethnobotanical heritages of the Kurdistan Region known by its high multicultural and multiethnic communities.

KEY WORDS: Ecosystem services; biodiversity conservation; natural resources; traditional knowledge; natural heritage.
DOI: http://dx.doi.org/10.21271/ZJPAS.33.s1.3
ZJPAS (2021) , 33(s1);19-30 .

* Corresponding Author:
Ali M.K. Galalaey
E-mail: rabar.salih@su.edu.krd
Article History:
Published: 15/03/2021
INTRODUCTION:

Wild edible plant term is commonly referred to the non-cultivated plant species that are found in both natural and urbanized areas and they have often nutritive and socio-cultural values (Kallas, 1996; de Cortes Sánchez-Mata & Tardío, 2006; Michael, 2008). In broad biological term, Heywood (1999) was generalized the wild edible plant term to all plants that grow spontaneously in self-maintaining populations in natural or semi-natural ecosystems and can exist independently of direct human action. In this wild food context, the ethnobotanical approach is at the heart of our understanding of the indigenous plants and their primary practical uses through the traditional knowledge of a particular local culture (Jones, 1941; Hamilton et al., 2003). Therefore, the ethnobotanical studies can be seen as a door into cultural and traditional features as well as a way to better understand the future of human relationships with the nature (Heywood, 1999; Hamilton et al., 2003).

Wild edible plants have played a major role in human life and settlement since ancient times. Traditionally, the human societies have always used the indigenous plant species not only as a food source but also for fuels, medicines, clothing, home-made, chemical productions and as a feed for domestic animals (Hamilton et al., 2003; Schulp et al., 2014). Despite the development of the agriculture, the tradition knowledge of the wild food has not completely disappeared, their harvesting continues worldwide mainly due to their nutritional values for the human health benefits (Pardo-de-Santayana et al., 2007). From economical standpoint, the harvesting of these wild edible plants can offer a source of income for the rural families and traditional markets (Hamilton et al., 2003; Lead et al., 2010). In addition, in time of human crises, the wild food has played a key role in the population’s survival via maintenance of lives during the war, particularly for the region under siege (Jman Redzic, 2006; Tomkins et al., 2019).

In forced migration situation, the natural resources gathering are important for establishing connection between the new arrival migrants and host population (Gustafson, 2009; Peters et al., 2016).

Recent developments in the field of ethnobotany have led to renewed interest in the relationship between wild edible plants and particular traditional knowledge (Cotton & Wilkie, 1996; Cunningham, 2014). Thousands of wild plants parts are consumed as food in the world. People’s livelihood don’t depend only on the agricultural and animal products, but also other natural resources such as wild edible plants (Sundriyal & Sundriyal, 2004; Cunningham, 2014). In most remote areas, a major part of local people don’t have enough food to reach their daily needs and they mainly depend on their cultures for nourish diverse types of the wild food (Balemie & Kebebew, 2006; Reyes-García et al., 2006). Wild edible plants provide basic food for locals, serve as complementary food for indigenous people and offer an alternative source of cash for poor communities (Ju et al., 2013; Amente, 2017). Nevertheless, the types of wild edible plants still largely neglected in land-use projection and practice, economic development and biodiversity conservation efforts.

The traditional attributes and characteristics of the plant species have always been transferred from generation to generation throughout the natural course of everyday life. This traditional ecological knowledge in most cases is not written down anywhere, but it remains a part of an oral tradition (Cotton & Wilkie, 1996; Hamilton et al., 2003). Consequently, in recent years, the most ethnobotanical studies focus on record the lists of wild edible plants and their culinary uses.

The present research study was carried out in order to: -

1. to investigate and record the traditional knowledge of the local people about the wild plants used in the food and medicine of Erbil Hujran Basin. This Basin area has a rich cultural heritage and a natural environment.
2. to raise the awareness of the harvesting effects on their natural population dynamic.
3. to supplementary information on the plants used for feeding animals was provided.

2. Material and Methods

2.1 Study area

Hujran Basin is situated around 40 km in NE of Erbil city (latitudes = 36°22' to 36°24' N; longitudes = 44°16' to 44°19' E.), between (750 to 1400) m. a.s.l., at the main road passing Salahaddin (PirMam) to Shaqlawa (Figure 1). From landscape standpoint, this basin area is enclosed by Sefin Mountain and Hujran hill
(locally called Talani-PerRash or Mizqaute Mountains). It is mainly characterized by their deep valleys, cliffs, slides and slump features, cultivated plains and smooth slope mountain-sides. According to Köppen’s climate classification (Peel et al., 2007; Gaznayee, and Al-Quraishi, 2019a; Gaznayee, and Al-Quraishi, 2019b), this basin area has cold semi-arid climate with dry hot summer and cold dry winter where some snowfall is frequent during. Consequently, the vegetation structure is mainly characterized by the herbaceous and open steppic Oak forest formation and the vegetation period in this area is shorter than those more wet and temperate areas situate
d more in north such as Barzan and Choman areas. In addition, this Basin area undergoes intensified anthropogenic activities mainly due to the tourism and recreation activities in spring. Currently, many rare plant species threatened due to their natural habitat destruction (e.g. secondary house buildings) and overharvesting of the wild edible plants by local people (Hameed et al., 2016; Youssef et al., 2019).

Figure 1. The location of the Hujran Basin area, Erbil governorate, Kurdistan Region of Iraq.

2.2 Ethnobotanical method and data collection:
For this research paper, maximum traditional knowledge information was obtained through ethnobotanical semi-structure questionnaire approach. We have conducted face-to-face interviews and investigated various participants (mainly local rural people) during spring and summer 2018. In total, we have interviewed 68 informants from different age categories (57% between 40-60 years, 30% more than 60 years and 11% between 20-40 years) and, gender (% 60 were female and 40% male). The interviewed informants were divided into four main groups based on their education background (illiteracy, primary school, high school and university with (29%, 37%, 13% and 21%) respectively. The ethnobotanical questions was primarily focused on the local common plant name, plant part harvested and used and their culinary preparations. In order to have a global traditional knowledge overview, we completed these semi-structured interviews by field observation, plant collections, and group discussion.

Table 1. Demographic details of the interviewed informants.

| Categories     | Subcategory                | Person | Ratio (%) |
|----------------|----------------------------|--------|-----------|
| Gender         | Male                       | 27     | 39.7      |
|                | Female                     | 41     | 60.3      |
|                | Total                      | 68     | 100.0     |
| Age Groups     | 20-40                      | 8      | 11.8      |
|                | 40-60                      | 39     | 57.4      |
|                | 60 and older               | 21     | 30.9      |
|                | Total                      | 68     | 100.0     |
| Education      | illiteracy (none educated) | 20     | 29.4      |
|                | Literacy (know writing and reading) | 11 | 16.2    |
In this present research, the taxonomical identification of wild edible plant species was carried out thanks to direct field observation, specimen’s collections and illustration photos. Initially, the identification process was followed the flora of Iraq (Towsend and Guest, 1966-1985; Ghazanfar and Edmondson, 2013). This initial identification was systematically verified according to the floras of the Iraqi neighbouring countries: Flora of Iran (Rechinger, 1965-1977), Floras of Syria (Mouterde, 1966-1984), Flora of Turkey (Davis, 1965-1985; Güner et al., 2000). In addition, we have referred back to the recent scientific papers and useful plant field guides (Burnie, 1995; Blamey and Grey-Wilson, 2004; Hameed et al., 2016; Youssef et al., 2019).

| Education Level         | Number | Percentage |
|-------------------------|--------|------------|
| Primary school          | 14     | 20.6       |
| High school             | 9      | 13.2       |
| Graduated in university | 11     | 16.2       |
| Master                  | 2      | 2.9        |
| PhD                     | 1      | 1.5        |
| **Total**               | **68** | **100.0**  |

In this present research, the taxonomical identification of wild edible plant species was carried out thanks to direct field observation, specimen’s collections and illustration photos. Initially, the identification process was followed the flora of Iraq (Towsend and Guest, 1966-1985; Ghazanfar and Edmondson, 2013). This initial identification was systematically verified according to the floras of the Iraqi neighbouring countries: Flora of Iran (Rechinger, 1965-1977), Floras of Syria (Mouterde, 1966-1984), Flora of Turkey (Davis, 1965-1985; Güner et al., 2000). In addition, we have referred back to the recent scientific papers and useful plant field guides (Burnie, 1995; Blamey and Grey-Wilson, 2004; Hameed et al., 2016; Youssef et al., 2019).

Figure. 3. Monthly Precipitation, Relative Humidity, Maximum, Minimum, and Mean Temperature at Hujran Location Recorded between (2000 to 2019).

3. RESULTS & DISCUSSION

This research study set out with the aim of assessing the importance of the ethnobotanical activities in Hujran Basin. The wild edible diet is always reflecting the regional identity of local communities and their traditional ecological knowledge (Alexiades, 2003; Gerique, 2006; Luczaj et al., 2012; Schulp et al., 2014). In addition, the Zagros and Mesopotamian regions are one of the irreplaceable natural resources for crops, medicinal, aromatic and wild edible plants (Townsend & Guest, 1966-1985; Chakravarty, 1976; Youssef et al., 2019). Recently, Youssef et al. (2017) reported that the Zagros region is a fascinating area “Ethnobotanical Paradise” where the Kurds still maintain their living ethnobotanical practices. The harvesting of the wild edibles plants are not only part of the cultural history of the Zagrosian region but also are part of people’s local identity and tradition knowledge (Mati & de Boer, 2011; Ahmad & Askari, 2015; Ahmad, 2016; Derwesh, 2017; Tahir, 2017; Youssef et al., 2017).

Interestingly, the results of this study show that at least 87 wild edible plant species are harvested according to the traditional knowledge in Hujran Basin. These species are classified among 67 genera and 25 families (Figure 2). The floristic diversity in this Basin study area is highly rich providing diverse useful edible species with multiple uses. of the total families, the most dominant one is Fabaceae (with 13 species), Asteraceae (with 12 species), Brassicaceae and Rosaceae (10 species). This research study produced results which broadly corroborate the findings of the previous ethnobotanical studies in Kurdistan Region. For example, Tahir (2017) has reported 74 wild plant in Amedya districted with the following first five dominant families Rosaceae (10 taxa), Asteraceae (8 taxa), Apiaceae (7 taxa), Brassicaceae (5 taxa), and Fabaceae (7
taxa). In another side, Darwesh (2017) documented 98 wild edible plant taxa in Choman region where the dominant families were Brassicaceae, Rosaceae, Fabaceae, Asteraceae and Liliaceae. Also, Ahmed and Askarii (2015) mentioned 23 plant taxa as a wild edible plants in Hawraman region where the highest number of taxa is belong to Rosaceae family. In addition, Pieroni et al. (2017) have recorded 34 taxa in Hawraman region as wild edible plants, while the family dominant are Amaryllidaceae, Lamiaceae, Asteraceae, and Apiaceae each of them has three plant taxa. Contrary to expectation, others families were only presented by one wild edible species such as Berberidaceae, Plantaginaceae, Polygonaceae, Primulaceae and Rhamnaceae (Figure 2).

Figure 2. Plant families, genera and species of wild edible plants recorded in Hujran Basin area.

Wild plant diets have played a crucial role in securing livelihoods of the local communities particularly in rugged mountain areas worldwide (Tag et al., 2014). In Zagrosian mountainous areas Wild edible plants always provide a various wild diet supplement (Youssef et al., 2017). The current research study found that the major parts of the wild edible plant are mainly available during the spring and summer season. In addition, we document a high diversity of the plant parts used and harvested by the local community of Hujran Basin. Another important finding was that the majority of these edible species have multiple uses and serve for more than one part used categories. The most parts used are plant at seedling stage (30%) followed by the leaves, fruit and flowers categories with (14%, 13% and 7%) respectively (Table 1). Furthermore, of the total species, the herbaceous species (66 taxa) are highly harvested according to the traditional knowledge followed by the shrubs (12 taxa) and the trees (9 taxa).
Table 2. Total number of species and their frequency according to the different plant parts uses categories.

| Number of plant species | 100% |
|-------------------------|------|
| Flowers                 | 10   | 7 |
| Young shoot             | 9    | 7 |
| Fresh fruit             | 15   | 11 |
| Fruit                   | 18   | 13 |
| Seedling stage          | 42   | 30 |
| Aerial part             | 4    | 3 |
| Leaves                  | 20   | 14 |
| Gum                     | 1    | 1 |
| Root                    | 2    | 1 |
| Stem                    | 5    | 4 |
| Seed                    | 5    | 4 |
| Bulb                    | 7    | 5 |

Hujran Basin local communities have rich traditional knowledge regarding the wise use of edible wild plants to ensure food security through traditional drying and storage methods. The results of the present research study revealed that the majority of the wild edible species have multiple culinary preparation methods and uses. Interestingly, a high number (at least 50 species) of the wild edible plants are consumed after boiling or frying such as the wild leeks, *Gundelia* and *Anchusa* species. Simultaneously, 46 wild edible species were documented to be eaten raw such as *Smyrnium cordifolium* Boiss and *Silybum marianum* (L.) Gaertn. On the other hand, non-negligible plant parts serve also for more than one use categories: For example, different plant parts were used to make Dolma (Sarma), boiled and fired with egg, jam, eaten raw, with yogurt, cooking with burghul, as a spice, as a scent, nut, salads, frying on the ceiling and adding to bread. Furthermore, some plant seeds were found to be used to make cooking oil (Figure 3).

Figure 3: Diversity of the culinary preparation methods and uses of the wild edible plants in Hujran Basin area.

List of all the recorded wild edible plant species (67 in total) and uses are presented (Table 2). Interestingly, in the table 2, we discussed in details the following data: plants family, scientific names, local common names, variety of plant parts used, and the culinary preparation and uses of these wild
In general, the plants that are very common for us and we use them as edible plants like *Gundelia rosea* Al-Taey & Hossain, *Anchusa italic* Retz., *Nasturtium officinale* R.Br., *Capsella bursapastoris*, *Glycyrrhiza glabra* L., *Mentha longifolia* (L.) Hudson, *Malva sylvestris* L., *Prunus amygdalus* Batsch, *Rubus sanctus* (Schrelxlr)).

Table 3. List of the plant taxa recorded in Hujran Basin area with their plant family, scientific name, local name, part used and culinary preparation methods

| Family               | Scientific name, local name | Plant part(s) used | Preparations                                                                                                                                                                                                 | U/N  |
|----------------------|-----------------------------|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| Anacardiaceae        | *Pistacia eurycarpa* Yalt.  | Stem, seeds, fruit | Boiled, then fried in oil with onion and egg. Roots: eaten raw.                                                                                                                                         | 0.34 |
| Apiaceae             | *Annona squarrosa* L.       | Seedling stage     | Boiled, then fried in oil with onion and egg. Root: eaten raw.                                                                                                                                          | 0.09 |
| Apiaceae             | *Daucus carota* L.          | Seedling stage, roots | Seedling stage: Boiled, and then fried in oil with onion and egg. Root: eaten raw.                                                                                                                      | 0.25 |
| Apiaceae             | *Falcaria vulgaris* Bertol. | Leaves             | Young leaves eaten raw, Cooked and roasted with egg.                                                                                                                                                     | 0.15 |
| Apiaceae             | *Lagoecia cuminoides* L.    | Seedling stage     | Boiled, then fried in oil with onion and egg.                                                                                                                                                           | 0.13 |
| Apiaceae             | *Scandix pecten-veneris* L. | Seedling stage     | Boiled, and then fried in oil with onion and egg. You wetting it with some water and frying it on the ceiling.                                                                                         | 0.49 |
| Apiaceae             | *Smyrnium cordifolium* Boiss. | Stem               | Eaten raw after bark is peeled.                                                                                                                                                                         | 0.06 |
| Asparagaceae         | *Ornithogalum camusidatum* Bertol. | Seedling stage     | Boiled, then fried in oil with onion and egg, cooking with burgul.                                                                                                                                     | 0.75 |
| Asteraceae           | *Carduus pycnocephalus* L.  | Seedling stage     | Boiled, then fried in oil with onion and egg.                                                                                                                                                           | 0.33 |
| Asteraceae           | *Echinops sp.*              | Flowers            | Eaten raw.                                                                                                                                                                                               | 0.21 |
| Asteraceae           | *Gundelia rosea* Al-Taey & Hossain, | Young shoots or underground parts, roots. | Boiled, or boiled and then fried in oil and onion (or eggs), or roasted, made into kengr fish, nut.                                                                                                     | 0.29 |
| Asteraceae           | *Notobasis syriaca* (L.) Cass. | Stem               | Eaten raw after bark is peeled, Cooked and roasted with egg.                                                                                                                                            | 0.26 |
| Asteraceae           | *Scorzonera phaeopappa* (Boiss.) Boiss. | Leaves, seedling stage, roots | Seedling stage: Boiled, and then fried in oil with onion and egg. Roots: eaten raw.                                                                                                                   | 0.06 |
| Asteraceae           | *Scorzonera semicata* DC.    | Leaves, seedling stage, roots | Seedling stage: Boiled, and then fried in oil with onion and egg. Roots: eaten raw.                                                                                                                      | 0.06 |
| Asteraceae           | *Senecio vulgaris* L.        | Seedling stage     | Boiled, and then fried in oil with onion and egg. You wetting it with some water and frying it on the ceiling.                                                                                         | 0.18 |
| Asteraceae           | *Senecio vernalis* Waldst. & Kit. | Seedling stage     | Boiled, and then fried in oil with onion and egg. You wetting it with some water and frying it on the ceiling.                                                                                         | 0.28 |
| Asteraceae           | *Silybum marianum* L.       | Stem               | Eaten raw after bark is peeled, Cooked and roasted with egg.                                                                                                                                          | 0.06 |
| Asteraceae           | *Sonchus oleraceus* (L.) L. | Seedling stage     | Boiled, and then fried in oil with onion and egg.                                                                                                                                                       | 0.18 |

Table 3. List of the plant taxa recorded in Hujran Basin area with their plant family, scientific name, local name, part used and culinary preparation methods.
| Family          | Species                                      | Part(s)                       | Preparation                                                                 | References |
|-----------------|----------------------------------------------|-------------------------------|-----------------------------------------------------------------------------|------------|
| Fabaceae        | Onobrychis caput fiberossi (L.) Savi          | Seedling stage, young shoots, leaves | Boiled, then fried in oil with onion and egg. You wetting it with some water and frying it on the ceiling. | 0.13       |
| Fabaceae        | Lathyrus aphaca L.                            | Seedling stage, leaves        | Boiled, then fried in oil with onion and egg. You wetting it with some water and frying it on the ceiling. | 0.13       |
| Berberidaceae   | Bongardia chrysogonum (L.) Spach             | Young inflorescences, leaves  | Boiled or fried with eggs to make a special type of omelette; tea, eaten raw. | 0.31       |
| Boraginaceae    | Anchusa italica Retz.                        | Seedling stage, flowers       | Boiled, then fried in oil with onion and egg, flowers: eaten raw and herbal tea, you wetting it with some water and frying it on the ceiling. | 0.69       |
| Boraginaceae    | Onosma albo-rosea Fisch. &C.A.Mey.           | Flowers                       | Eaten raw                                                                   | 0.10       |
| Boraginaceae    | Onosma rostellatum Leh.                      | Flowers                       | Eaten raw                                                                   | 0.10       |
| Boraginaceae    | Onosma sericeum Willd.                       | Flowers                       | Eaten raw                                                                   | 0.10       |
| Brassicaceae    | Alyssum striosum Banks & Sol.                | Seedling stage                | Boiled, and then fried in oil with onion and egg, you wetting it with some water and frying it on the ceiling. | 0.16       |
| Brassicaceae    | Alyssum contempetum Schott & Kotschy         | Seedling stage                | Boiled, and then fried in oil with onion and egg, you wetting it with some water and frying it on the ceiling. | 0.21       |
| Brassicaceae    | Biscutelladidyma L.                          | Seedling stage                | Boiled, and then fried in oil with onion and egg, you wetting it with some water and frying it on the ceiling. | 0.12       |
| Brassicaceae    | Brassica rapa L.                             | Seedling stage, young shoot, leaves | Boiled, then fried in oil with onion and egg, leaves and young shoot: eaten raw, you wetting it with some water and frying it on the ceiling. | 0.50       |
| Brassicaceae    | Capsella bursa-pastoris (L.) Medik           | Seedling stage                | Boiled, and then fried in oil with onion and egg. | 0.59       |
| Brassicaceae    | Eruca sativa Mill.                           | Seedling stage, young shoot, leaves | Boiled, then fried in oil with onion and egg, leaves and young shoot: eaten raw. You wetting it with some water and frying it on the ceiling. | 0.13       |
| Brassicaceae    | Erysimumrepandum L.                          | Seedling stage                | Boiled, and then fried in oil with onion and egg, you wetting it with some water and frying it on the ceiling. | 0.16       |
| Brassicaceae    | Nasturtium officinale R.Br.                  | aerial parts                  | Eaten as salad                                                              | 0.66       |
| Brassicaceae    | Thlaspiarvense L.                            | Seedling stage                | Boiled, and then fried in oil with onion and egg, you wetting it with some water and frying it on the ceiling. | 0.15       |
| Caryophyllaceae | Stellariapallida (Dumort.) Pire              | Seedling stage                | Boiled, and then fried in oil with onion and egg, you wetting it with some water and frying it on the ceiling. | 0.15       |
| Caryophyllaceae | Stellaria media (L.) Vill.                   | Seedling stage                | Eaten raw                                                                   | 0.13       |
| Fabaceae        | Astragalusspinosus (Forsk.) Muschl.          | Flower                        | Eaten raw                                                                   | 0.19       |
| Fabaceae        | Coronillascorpioides (L.) Koch               | Seedling stage                | Boiled, and then fried in oil with onion and egg. | 0.09       |
| Fabaceae        | Glycyrrhizaglabra L.                         | Roots                         | Chewed and sucked on water and drinking as juice.                           | 0.63       |
| Fabaceae        | Hymenocarpsciriinnatus (L.) Savi             | Seedling stage                | Boiled, and then fried in oil with onion and egg. | 0.13       |
| Fabaceae        | Lathyrisicera L.                             | Seed, seedpod                 | Seed: eaten raw                                                             | 0.31       |
| Fabaceae        | Lathyrsaphaca L.                             | Aerial parts                  | Eaten raw, Cooked and roasted with egg.                                     | 0.43       |
| Fabaceae        | Medicapolyomorpha L.                         | Fresh fruit                   | Eaten raw                                                                   | 0.07       |
| Fabaceae        | Osobrychis caput-galli                       | Fresh fruit                   | Eaten raw                                                                   | 0.04       |
| Family | Species | Part of Plant | Use |
|-------|---------|---------------|-----|
| Fabaceae | Pisum sativum L. | Fruit, leaves and seed, seedling stage | Immature seeds - raw or cooked. Sweet and delicious. Boiled, then fried in oil with onion and egg. |
| Fabaceae | Prosopis farcta (Banks & Sol.) J.F.Macbr. | Malhach | Young fresh fruit | Eaten raw |
| Fabaceae | Scorpiurus muricatus L. | Gulaaxemazemokok | Seedling stage | Boiled, then fried in oil with onion and egg |
| Fabaceae | Vicia sativa L. | Kalimarana | Fresh seed, young pod | Eaten raw |
| Fabaceae | Quercus ilex L. | Bariu | Fruit | Grill in fire, remove testa and eating. |
| Fabaceae | Robinia pseudoacacia | Mam Darzila, sahatoka | Seedling, Fruit | Boiled, and then fried in oil with onion and egg. |
| Fabaceae | Robinia pseudoacacia | Mam Darzila, sahatoka | Seedling stage and fresh fruit | Boiled, and then fried in oil with onion and egg. You wetting it with some water and frying it on the ceiling |
| Fabaceae | Mentha longifolia (L.) Hudson | Puunga | Aerial parts, leaves | Eaten raw. Cooked and roasted with egg. Boiled and then fried in oil with onion (or eggs). Mix with yogurt as Soup. As a scent, as spice, the leaves can be added to salads |
| Fabaceae | Salvia indica L. | Rayhanakivi | Flower, young shoot | Eaten raw and herbal tea |
| Fabaceae | Salvia trichocladabent | Rayhanakivi | Flowers | Eaten raw and herbal tea |
| Fabaceae | Thymus capitatus (L.) Hoffmanns. & Link | Jatrakiwi | Leaves | As a scent, as spice |
| Malvaceae | Alcea rosea (L.) | Heiro | Leaves | Chopped with Rice or wheat making Dolma (Sarma) |
| Malvaceae | Malvaviscus arboreus | Tollka, Giyapaniroka | Seedling, fresh Fruit, leaves | Boiled, and then fried in oil with onion and egg. Cooked with Burgul, chopped with Rice making Dolma (Sarma), fruits are eaten freshlly. |
| Malvaceae | Malvaviscus arboreus | Tollka, Giyapaniroka | Seedling, fresh Fruit, leaves | Boiled, and then fried in oil with onion and egg. Cooked with Burgul, chopped with Rice making Dolma (Sarma), fruits are eaten freshlly. |
| Moraceae | Ficus carica L. | Tawska | Fresh fruit, Dry fruit | Eaten raw, Jam |
| Oleaceae | Olea europaea L. | Tuyuspi | Fersh fruit, Dry fruit | Eaten raw, Jam |
| Olearaceae | Olive | Zaytun | Fruit | Eaten raw |
| Papaveraceae | Papaver rhoeas L. | Gulanisan | Seedling stage, seed | Seedling stage: Boiled, and then fried in oil with onion and egg. Seed: adding to bread |
| Papaveraceae | Papaver somniferum L. | Gulanisan | Seedling stage, seed | Seedling stage: Boiled, and then fried in oil with onion and egg. Seed: adding to bread |
| Plantaginaceae | Veronica longifolia | Gulian | Seedling stage, fresh fruit | Seedling stage: eaten raw and Boiled, then fried in oil with onion and egg. leaves: eaten raw, salad |
| Poaceae | Hordeum vulgare | Bulb | Eaten raw |
| Polygonaceae | Rumex crispus L. | Trshoka | Young leaves | Eaten raw |
| Primulaceae | Anagallis arvensis L. | Chaw pshila | Leaves, seedling stage | Leaves - Boiled, then fried in oil with onion and egg |
| Ranunculaceae | Adonis ramosa | Gulanisan | Seedling stage | Boiled, and then fried in oil with onion and egg. |
| Ranunculaceae | Ranunculus arvensis L. | PeiKallabab | Aerial parts | Cooked and roasted with egg |
| Rhamnaceae | Paliurus spina-christi Mill. | Astre, darzee, kee | Fresh fruit | Eaten raw |
| Rosaceae | Crataegus azarolus | Geiwz, Goeazh | Fruit | Eaten raw |
| Rosaceae | Potentilla anserina | Gulanisan | Seedling stage | Boiled, and then fried in oil with onion and egg. |
| Rosaceae | Prunus mume | ChaqallaBawi | Fresh fruit, seed | Fresh fruit: eaten raw. Seed: fried with oil putting on rice and nut. |
| Rosaceae | Prunus armeniaca (Olivier) | Kalla Sheen | Fruit | Nuts, Immerse it into saline. |
| Rosaceae | Prunus domestica (Lam.) | Chaqalla, | Young fresh | Eaten raw |
4. Conclusion

This research study has given an account of and the ethnomedical aspects for the tradition knowledge of the wild edible plants and their culinary preparation uses In Hujran Basin area. The wild edible plants play a crucial role on food security and human health, particularly in remote mountainous areas and in time of crises (Tomkins et al., 2019). From ethnomedical standpoint, the wild food and their culinary preparation reflect the regional identity of local communities that they ordinarily pass down through oral tradition when they threaded at real risk of disappearing. This research study has found that at least 87 wild edible plants are harvested by local communities belonging to 67 genera and 25 families. The evidence from this study revealed that the local communities of Hujran Basin area have rich tradition ecological knowledge with multiple culinary preparation methods and uses: They were harvested according to different part uses (leaves, shoot, fruit, flowers, bulbs, etc.) and they are the subject to various purposes (Dolma, eaten raw, boiled and fried with egg, etc.). In addition, we have provided in details an ethnobotanical database of all the recorded wild edible plant species and their culinary preparation and uses. These ethnobotanical documentation databases have a number of important implications for maintaining the tradition ecological knowledge particularly under the new exodus threats of the rural people to city like Erbil. Moreover, Zagros region can offer an important area for the implementation of ecotourism, small activities for the collection of local wild food, and the establishment of local tradition markets (Pieroni et al., 2017). On the other hand, some wild edible plants have commonly harvested and/or overharvested such as Gundelia species and there are a real threat to their population dynamic. Therefore, there is a real need to widely publish the awareness between the local communities about how to protect the natural resources via minimizing the intensive picking and clipping from the nature through the ethnodomestication of some rare wild edible plants (Hussein et al., in revision).

Acknowledgements: The authors extend their heartfelt thanks to all the informants of the research area for sharing their knowledge and their cooperation during field study is duly acknowledged.

5. REFERENCES

Ahmad, S. A., & Askari, A. A. (2015). Ethnobotany of the Hawraman region of Kurdistan Iraq. Harvard papers in botany, 20(1), 85–89.

Ahmed, H. M. (2016). Ethnopharmacobotanical study on the medicinal plants used by herbalists in Sulaymaniyah Province, Kurdistan, Iraq. Journal of ethnobiology and ethnomedicine, 12(1), 8.

Alexiades, M. N. (2003). Ethnobotany in the third millennium: expectations and unresolved issues. Delpinoa, 45, 15-28.

Amente, D. A. (2017). Ethnobotanical survey of wild edible plants and their contribution for food security used by Gumuz people in Kamash Woreda; Benishangul Gumuz Regional State; Ethiopia. J Food Nutri Sci, 5, 217-24.

Balemie, K., & Kebebew, F. (2006). Ethnobotanical study of wild edible plants in Derashe and Kucha Districts, South Ethiopia. Journal of Ethnobiology and Ethnomedicine, 2(1), 53.

Blamey, M., & Grey-Wilson, C. (2004). Wild flowers of the Mediterranean. A & C Black.

Burnie, D. (1995). Wild Flowers of the Mediterranean. London: Dorling Kindersley 320 p.-col. illus.

| Rehd. var. argentea. | Bawikiwilka | Fruit | Eaten raw | 0.32 | Rosaceae | Prunus microcarpa C. A. Mey. | Ballalluuk | Mature Fruit | Eaten raw | 0.28 | Rosaceae | PyrussryicaBoiss. | Krokiwiwilka | Fruit | Eaten raw | 0.40 | Rosaceae | Rosa canina L. | gularz,gulabax | Flower | Jam, eaten raw | 0.68 | Rosaceae | Rubussanctus (Schrelxr) | Drri, Drila, Tuutrrk, TuuDrrk | New stem. Fruit, leaves | Fruits and fresh stem, Molasses, jam | 0.46 | Rosaceae | Rubuscaesius L. | Drri, Drila, Tuutrrk, TuuDrrk | New stem. Fruit, leaves | Fruits and fresh stem, Molasses, jam | 0.75 | Vitaceae | Vitisvinifera L. | Palkameiw, GallaMeiw | Leaves and fruit | Leaves; Dolma (Kurdish dish), Fruit eaten raw or sun dried; Mewij (raisens), Doşaw (syrup), juice. |
School of Natural and Applied Science, Kahramanmaras Sutcu Imam University, Turkey).

Tomkins, M., Yousef, S., Adam-Bradford, A., Perkins, C., Grosrenaud, E., Metough, M., & Viljoen, A. (2019). Cultivating refuge: The role of urban agriculture amongst refugees and forced migrants in the Kurdistan region of Iraq. *International Journal of Design & Nature and Ecodynamics, 14*(2), 103-118.

Towsend, C. C., Guest, E., (1966-1985). Flora of Iraq Vol. 1-8.” Baghdad: Ministry of Agriculture, Iraq.

Youssef, S., Mahmood, A., Hussein, W., Véla, E. (2017). Montagnes du Zagros, un paradis terrestre aux pratiques ethnobotaniques vivantes. *La Garance voyageuse*, 120: 41-45.

Youssef, S., Galalaey, A., Mahmood, A., Mahdi, H., & Véla, E. (2019). Wild orchids of the Kurdistan Region areas: a scientific window on the unexpected nature of the North-Western Zagros. *La Motte-d’Aigues* (FR): Société Méditerranéenne d’Orchidologie, 164p. ISBN: 978-2-900082-08-9.

A N Author, B O Author and C I Author (1990), Article in conference, *Proc. IEEE Intl. Conf. Autom. Control*, Atlanta, pp. 231–245.

B Scribe and C Author (1987), Article in an edited book, In *Book Title* (B Brown & G Green, Eds), Ironing Press, London, pp. 231–245.

A Writer (1993), *Book Title*, Ironing Press, London.