

RESEARCH PAPER

Vascular Plants of Bani Harir Mountain (Harir intramural bound)

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ABSTRACT:

Field work survey conducted in this investigation area Bani Harir Mountain (MRO, Kurdistan-Iraq) and their adjacent places. The important goals of this study are to determine vascular plant species of this mountain and their adjacent because of have rich plant diversity which has not been surveyed in detailed by previous botanists up to now and it's not signified in Flora of Iraq. For this purpose, new localities for plant species should be reorganized in flora of Iraq. This survey includes all species of natural local flora of vascular plants which are distributed at the mountains and their adjacent. All the plants those are were determined, only they are new record according to the surveyed area. To constitute the floristic composition, field survey duration was from beginning of spring season 2020 and continued to spring season of 2021. For this purpose; field works were divided to 7 sections and more than 950 plant samples were collected. At the result 247 plant species from 67 families and 183 genera were determined and identified. The 3 largest families in the area of this study is fabaceae family (33 species; 13.36%), the second largest is Asteraceae family (30 species; 12.14%), and the third largest family is Poaceae (22 species; 8.9%). These 3 families followed by Brassicaceae family with (13 species), and Rosaceae family with (12 species).

KEY WORDS: Vascular plants, Plant surveying, Plant collection. Bani Harir mountain Kurdistan-Iraq.

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1.INTRODUCTION :

Plant Surveying should be systematic and comparable; data collection, storage and plant identification standards should be observed (Heard and Channon, 1997). Objectives for surveys may be to detect new invaders early, to locate the maximum number of species, to locate the most populations of a single (known) species, or to gather landscape-level data (Allard and Moore, 2011). The field works related with Flora of Iraq started in 1960 as a project of the National Herbarium, Ministry of Agriculture-Baghdad in collaboration with Royal Botanic Gardens, Kew, UK. The Flora of Iraq, with its wealth of over ±3300 species, was planned to be published in 9 volumes (Ghazanfar and Edmondson, 2013).

An analysis of the distribution of the flora in the different physiographic regions and districts of Iraq shows the Mountain Region (northern mountains of Iraq) and the Central Alluvial Plains District in the Lower Mesopotamian Region to be the most species rich (Ghazanfar and McDaniel, 2016). An analysis of the distribution of species by physiographic regions and districts shows that the northern regions are the most species rich, with the mountain region containing 40% of the total flora (Zohary, 1973). Many taxonomists have worked in the region, they've always tried to complete the Iraqi flora despite scientific source of very limited, there studies similar to this study conducted previously in different districts and different regions such as; Survey of vascular plants of Sinjar Mountain (Khalaf, 1980). Survey of vascular plants of Piramagrün Mountain (Fars, 1984). Saeed, Surveyed of the Flowering plants of Gali Ali Beg region in Erbil-Iraq (Saeed,

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2002). Survey to the vascular plants of Gomaspan strait and around region (Ahmed, 2010). Survey to the vascular plants of Hawraman region (Ahmed, 2013). Survey vascular plant taxa of Hujran Basin (Hameed, 2016). Plant Biodiversity and Ethnobotanical Properties of Various Plants in Choman (Darwesh, 2017).

- Goal of this work:

- 1- To survey the Bani Harir mountain.
- 2- To determination families, genera and species of this mountain.
- 3- To determination of new species or new record.
- 4- Mention some of the ecological or beneficial uses of included plants.

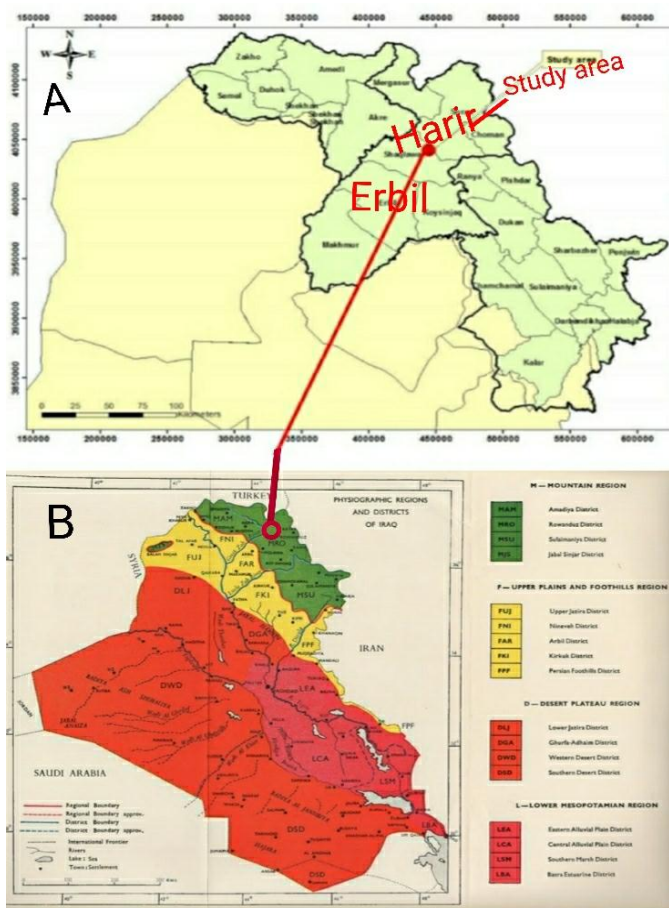


Plate 1 A- Location map of surveyed Area (Ghaib, 2016), (B) Physiographic regions map of Iraq (Guest, 1966).

LOCATION AND GEOLOGY

The republic of Iraq is in southwest Asia between latitudes $29^{\circ} 5'$ and $37^{\circ} 22'$ N and longitudes $38^{\circ} 45'$ and $48^{\circ} 45'$ E; it forms the eastern border of the Arab countries. (Omer, 2011). Kurdistan region northern of Iraq mostly mountain area, varying from some (500-800m) in altitude in the lowest valleys to (2000-3600m) at the top of the

highest area, Study area is part of the mountain region Rowanduz district (abbreviated by MRO) according to Guest (1966) division (Guest, 1966). The Studied area is located within the Folded Zone of Iraq according to the well-known (Dunnington, 1958) tectonic subdivision of the Iraqi territories, The geological reasons are that the limestone of the Bekhme Formation (The main aquifer in northern Iraq) has a very steep dip on the southwestern limb of the Harir Anticline, Harir area is located within the Zagros high folded zone, which is characterized by relatively long and high-amplitude anticlines (Ghaib, et al, 2009). Harir sub district is about 60 km northeast of Erbil city which situated in north east of Iraq (Iraqi Kurdistan region).

Harir Mountain is located north and north eastern of Harir city, it's divided to both Harir and Khalifan City boundaries. The most extended stretch in the study area also its length is about 29 km', it is high from the highest point about 1550 m according to sea level and its area about 250 km'. The study area lies between longitudes $44^{\circ} 16'$ and $44^{\circ} 30'$ East and latitudes $36^{\circ} 22'$ and $36^{\circ} 38'$ North, within the Iraqi Kurdistan Region. The Anticline has two or double draft, asymmetrical and cylindrical shape (Al-Nabawi, 2002). The Longitude and Latitude of studied area are received from lower most places to highest of it.

MATERIALS AND METHODS

Plant samples are the materials of this study which collected and dried according to standard herbarium technique (Bridson and Forman, 1998). The plant samples are collected in primitive spring season 2020 and continued to spring season of 2021. For the perfect and accurate identification process, complete characters both vegetative and reproductive must be present predominately. The specimens morphologically analysis with dependent (stem, flower, fruit and leaves) has been cross-sectioned by hand and most of the taken species were photographed in their habitat. Two main techniques for plant surveys are generally used: random wander and systematic splits, the random wander are useful in difficult terrain or irregularly-shaped localities. The identification process dependent on the available floras, journals, scientific papers, plant field guides and dissertation pertinent to the flora of Iraq and neighboring countries. During this study about 950 specimens were collected at 7 sections

on 46 trips. The identification process was followed on the present floras; Flora of Iraq, (Khalaf, 1980), (Fars, 1983). (Saeed, 2002), (Fatah, 2003), (Ahmed, 2010), (Ahmad, 2013), (Hameed, 2016), and (Darwesh, 2017). Surveyed area divided to 7 sections, usually for division dependent for the area each of the village region ownership for the mountain. Gulak village was represented section 1, it ownership the area of

Mountain from the Hamilton road side to highlands of it, parallel to the Darbandok Village boundary. Each of Gulak, Darbandok, Harir, Khrwatan, Bawyan, Sisawa, and Shexmamudian are the villages represented Sections 1, 2, 3, 4, 5, 6, 7, respectively. As showed from (Plate 2). As well as Longitude and Latitude of sections (Table 1).

Table 1. Geographical locations of the surveyed area

Section 1	Gulak Village, Longitude: 700-1300 m, 36° 36'24.6" N, Latitude 44°19'37.4" E. to Longitude: 36° 30'37.3" N, Latitude 44°24'41.3" E.
Section 2	Darbandok Village, 730-1400 Longitude: 36° 34'32.7" N, Latitude 44°20'16.1" E. to Longitude: 36° 30'37.3" N, Latitude 44°24'41.3" E.
Section 3	Harir Town, 730-1500 Longitude: 36° 33'59.7" N, Latitude 44°21'26.1" E. to Longitude: 36° 30'37.3" N, Latitude 44°24'41.3" E.
Section 4	Khrwatan Village, 750-1500 Longitude: 36° 32'09.3" N, Latitude 44°23'08.3" E. to Longitude: 36° 30'37.3" N, Latitude 44°24'41.3" E.
Section 5	Bawian Village, 750-1510 Longitude: 36° 30'57.4" N, Latitude 44°23'43.1" E. to Longitude: 36° 30'37.3" N, Latitude 44°24'41.3" E.
Section 6	Sisawa Village, Longitude, 740-1500 36° 29'47.5" N, Latitude 44°24'35.8" E. to Longitude: 36° 30'37.3" N, Latitude 44°24'41.3" E.
Section 7	Shexmamudian Village, 750-1520 Longitude: 36° 28'05.8" N, Latitude 44°26'17.2" E. to Longitude: 36° 30'37.3" N, Latitude 44°24'41.3" E.



Plate 2. Physiography of the surveyed area After founding of plants at the field usually some of them capable to interlace but others need to spade to dig out and collection of them, then usually they dried in a shadow place under simple pressure in a newspaper for two or three days with a suitable shape for the purpose revelation all parts of the plant. Some of plants are identified from the field but some of other need to superfine identification with dependent different source, then put them to special labeled. For easy referencing, an alphabetic arrangement of all plant species was used from family to the variety ranks. Family limits and generic placements follow (Mabberly, 2008). The Longitude and Latitude of studied area are received from lowermost place to highest of it. Beside of natural plants some of artificial vegetation (Tree) that suitable for the characteristic species of the habitat are surveyed mostly includes Suburban, Waterside, Garden and wayside vegetation.

ABBREVIATIONS

The abbreviations used in the text and in the floristic list of Bani Harir mountain are as follows: **an**: annual plants, **bi**: biennial plants, **pe**: perennial plants, **Tr**: Tree, **Sh**: Sh, **Fe**: Fern according to plant distribution, **(M)** for other mountain districts in Kurdistan-Iraq, **I**: for Iran, **S**: for Syria, **T**: for turkey, **Vo**: Voucher number for plant specimens.

RESULTS and DISCUSSIONS

A total of 247 plant species from 67 families and 183 genera were identified. Of these, 110 species belonged to Spermatophyta, which included 3 taxa from Gymnospermae and 241 plant species from Angiospermae. Also the remaining 3 taxa belonged to Pteridophyta as there showed from

See (Table 2) and (Table 3). About 950 plant samples were collected from studied area. Generally, division of all plants to their families, genera and taxa according to the large taxonomical groups illustrated from these two. The five largest families given as follow; Fabaceae with 33 plant species, Asteraceae with 30 plant species, Poaceae with 22 plant species, Brassicaceae with 13 plant species, and Rosaceae 12 plant species, as from Table4.

The plants were collected from the process of plant surveying, usually they are different in Results according to family numbering, genus and species numbering from a section to another section of study area, which it's dependent of some factors such as, attempt of researcher, capability of researcher, biological factor and environmental factors of the study area. Most of the plant cover of Bani Harir Mountain and the areas around it is of thick or lush herbs (Herbaceous plants), that covering the slopes, valleys and the top of the studied area, along with the Hills and plains on both sides. Most of the forests were described from the eastern and northern of the Mountain and rich in plant community if compared with other sides because western and southern of the Mountain is mostly rocky soil, slope surface, also it's nearness from inhabited and shady place which helps to deliverance of trees to drought through reduction of rain fall. All the plants that are recorded and determined, they were new record according to the surveyed area, The largest life cycle of identified 247 vascular plant species are herbs with 208(%84.21) plant species, of these 121 (%58.17) of which are `annual; 4 (%1.92) of which are `biennial; 83 (%39.9) of which are `perennial`, (Table 5). The others; 15 shrubs (%6.07), 21 trees (%8.5) and 3 ferns (%1.21), (Table 6) and (Table 6). See list of the flora in the supplement.

Table 2. Plant groups according to their taxa

	Number of Families	Number of Genera	Number of species
Pteridophyta	٢	٣	٣
Spermatophyta	65	١٨٠	٢٤٤
Total	67	١٨٣	٢٤٧

Table 3. Groups of Spermatophyta

	Number of Families	Number of Genera	Number of species
Gymnosperme	٢	3	3
Angiospermae	٦٣	١٨٠	241
Total	٦٥	١٨٣	٢٤٤

Table 4. Ratio of largest families with their species number:

Family	Taxa number	Ratio(Total flora)	Ratio (five largest family)
Fabaceae	33	13.36	30
Asteraceae	30	12.14	27.27
Poaceae	22	8.9	20
Brassicaceae	13	5.26	11.8
Rosaceae	12	4.85	10.9
Total	110	%44.51	%100

Table 5. Plant duration:

Life cycle	Species number	Ratio
Annual herbs	121	58.17
Biennial herbs	4	1.92
Perennial herbs	83	39.9
Total	٢٠٨	١٠٠.٠٠

Table 6. Plant habit:

Life spans	Taxa number	Ratio
Herb	٢٠٨	٨٤.٢١
Shrub	١٥	٦.٠٧
Tree	٢١	٨.٥
Fern	٣	١.٢١
Total	٢٤٧	١٠٠.٠٠

Supplement: Flora list of the study area

The systematic list is given as follow;

1. ACERACEAE

1. *Acer monspessulanum* L.

(Tr, M, I, T, S), Section, 4, (Vo-160).

2. ADIANTACEAE

2. *Adiantum capillus-veneris* L.

(Fe, M, I, S, T), Section, 1, 2, 3, 4, 5, (Vo-185).

3. *Chelianthes persica* (Bory) Mett. ex Kuhn.

(Fe, M, T, I), Section, 1, 3, 4, 5, (Vo-220).

3. ALLIACEAE

4. *Allium ampeloprosom* L.

(Pe, M, S, T, I), Section, 2, 3, 4, 5, (Vo-100, 301).

5. *Allium rotundom* L.

(pe, M, S, T, I), Section, 3, (Vo- 125).

4. AMARANTHACEAE

6. *Amaranth albus* L.

(an, M, S, T, I), Section, 4, 5, (Vo-186).

7. *Amaranth retroflexus* L.

(an, M, S, T, I), Section, 4, 7, (Vo- 14).

5. ANACARDIACEAE

8. *Pistacia eurycarpa* Yalt.

(Tr, M, I, S, T), Section, 1, 2, 3, 4, 5, 6, 7, (Vo- 3, 437).

9. *Pistacia khinjuk* Stocks.

(Sh, M, I, S, T), Section, 1, 2, 3, 4, 5, 6, 7, (Vo- 221, 504).

10. *Pistacia vera* L.

(Tr, M, S, T, I), Section, 3, (Vo-126).

11. *Rhus coriaria* L.

(Sh, M, S, T, I), Section, 3, 6, (Vo-25).

6. APIACEAE (UMBELLIFERAE)

12. *Ainsworthia trachycarpa* Boiss.

(an, M), Section, 2, 4, (Vo-52).

13. *Apium nodiflorum* (L.) Lag.

(pe, M), Section, 3, 4, 6 (Vo-37, 508)

14. *Eryngium campestre* L.

(Pe, P, M, I, T), Section, 2, 3, 7, (Vo-151).

15. *Lagoecia cuminoides* L.

(an, M S, T, I), Section, 2, 7, (Vo-187).

16. *Smyrniium cordifolium* Boiss.

(bi, M, I, T, S), Section, 3, 4, (Vo-65).

17. *Scandix stellata* L.

(an, M, T, I, S), Section, 3, 4, 6, (Vo-227).

18. *Turgenia latifolia* (L.) Hoffm.

(an, M, S), Section, 1, (Vo-76).

19. *Torilis leptophylla* (L.) Rchb.f.

(an, Th, M, I, T, S), Section, 4, (Vo- 189).

7. APOCYNACEAE

20. *Nerium oleander* L.

(Sh, M, I, S, T), Section, 1, 4, 7, (Vo-101, 305).

8. ARACEAE

21. *Eminium spiculatum* (Blume) Schott

(pe, M, I, T), 3, 4, (Vo-53)

9. ARISTOLOCHACEAE

22. *Aristolochia bottae* Jaub. & Spach.

(pe, M, S, T, I), Section, 3, 4, 5, 6, (Vo-152).

10. ASPARAGACEAE

23. *Bellevalia kurdistanica* Feinbrun.

(pe, M, I, T), Section, 3, 4, (Vo-188).

24. *Ornithogalum krdicum* Bornm.

(pe.), Section, 3, 4, (Vo- 77)

11. ASPLENIACEAE

25. *Cetarach officinarum* Willd.

(Fe, M, S, T, I), Section 1, 3, 4, 5, 6, 7, (Vo-223, 405).

12. ASTERACEAE (COMPOSITAE)

26. *Anthemis pseudocotula* Boiss.

(an, M, S, I) Section, 1, 2, 3, 4, 5, 6, 7, (Vo-306)

27. *Callendula arvensis*.

(an, M, S, T), Section, 2, 3, 4, 5, 6, , (Vo-38, 412).

28. *Carthamus oxyacantha* M. Bieb.

(an, M, I, T), Section, 1, 2, 3, 4, 5, 6, 7, (Vo-102, 440).

29. *Carlina corymbosa* L.

(pe, M), Section, 2, (Vo-190).

30. *Centaurea behen* L.

(pe, M, I), Section, 8, (Vo-310)

31. *Centaurea iberica* Trev. ex Spreng.

(pe, M, I, T, S), Section, 2, 3, 4, (Co-128, 402).

32. *Centaurea solstitialis* L.

(pe, M, I, T), Section, 1, 3, 4, 7, (Vo-154, 410).

33. *Cichorium intybus*.

(an, M, I, T, S) Section, 2, 3, 4, 5, 6, 7, (Co- 224,442).

34. *Conyza bonariensis* (L.) Cronquist.

(an, M, T), Section, 2, 3, 4, (Vo-54).

35. *Crepis sancta* (L.) Baboc.

(an, M, T, I), Section, 3, 4, 5, (Vo-193).

36. *Crupina crupinastrum* (Moris) Vis.

(an, M, I, T, S), Section, 3, 4, 6, 7, (Vo-129).

37. *Echinops* sp.

(Pe, M, I), Section, 1, 2, 3, 4, 5, 6, 7, (Vo-26, 221).

38. *echinops spinosissimus* L.

(Pe, M, I), Section, 1, 3, (Vo-15)

39. *Filago pyramidata* L.

(an, M, S, T) Section, 2, 6, (Vo-103)

40. *Gundelia tournefortii* L.

(pe, M, I, T, S), Section, 1, 2, 3, 4, 5, 6, 7, (Vo-225, 413).

41. *Hedypnois rhagadioloides* (L.) F.W.Schmidt.
(an, M, I, T), Section, 4, 6, (Vo-194).

42. *Helichrysum arenarium* (L.) Moench
(pe, M, T, I), Section, 3, 4, 5, (Vo- 613)

43. *Lactuca serriola* L.

(bi, M, S, T, I), Section, 1, 2, 3, 4, 5, 6, 7, (Vo-155, 414).

44. *Lactuca saligna* L.

(an, M), Section, 4, (Vo-130).

45. *Matricaria aurea* (Loefl.) Sch.Bip.

(an, M, S, T), Section, 3, (Vo-226).

46. *Notobasis syriaca* (L.).

(an, M, I, T, S), Section, 1, 2, 3, 4, 5, 6, 7, (Vo-156, 311).

47. *Onopordum carduchorum* Bornm. Beauverd.

(bi, M, I, T, S), Section, 1, 3, 4, 6, (o- 78).

48. *Picnomon acarna* (L.) Cass.

(an, M, I, T, S), Section, 2, 4, 5, 7 , (Vo-192).

49. *Scorzonera pseudolanata* Grossh.

(pe, M, I, T), Section, 4, (Vo-66).

50. *Rhagadiolus stellatus* (L.) Gaertn.

(an, M, I, T), Section, 3, (Vo-55).

51. *Senecio vernalis* Waldst. & Kit.

(an, M, S, T), Section, 3, 4, 5, 6, (Vo-131)

52. *Silybum marianum* (L.) Gaertn.

(an, M, I, T, S), Section, 1, 2, 3, 4, 5, 6, 7, (Vo-227, 442).

53. *Sonchus oleraceus* (L.) L.

(an, M, S, T, I), Section, 3, 4, (Vo- 4)

54. *Steptorhamphus tuberosus* (Jacq.) Grossh.

(pe, M), Section, 1, (Vo- 621)

55. *Urospermum picroides* (L.) Scop. Ex

F.W.Schmidt.

(an, M, S, T), Section, 5, (Vo- 79)

56. *Xanthium strumarium* L.

(pe, M, I, T, S), Section, 1, 3, 4, 6, 7, (Vo- 195)

13. BERBERIDACEAE

57. *Bongardia chrysogonum* (L.) Spach.

(pe, M, I, T), Section, 4, (Co- 104)

14. BORAGINACEAE

58. *Anchus azurea* Mill.

(pe, M, S, T), Section, 2, 3, 5, 6, 7, (Vo- 518)

59. *Echium italicum* L.

(pe, M, I, T), Section, 2, 3, 5, 6, 7, (Vo-228).

60. *Onosma alborosea* Fisch. & C. A. Mey.

(pe, M, T), Section, 1, 2, 3, 4, (Vo- 39).

15. BRASSICACEAE (CRUCIFERAE)

61. *Alyssum strigosum* Banks & Sol.

(an, M, T, I, S), Section, 3, 4, (Vo-16).

62. *Biscutella didyma* L.

(an, M, T, I, S), Section, 3, 6, (Vo-158).

63. *Brassica nigra* L.

(an, M, T, I, S), Section, 2, 3, 4, 5, 6, (Vo-132).

64. *Capsella bursa-pastoris* (L.) Medik.

(an, M, I, T, S), Section, 2, 3, 4, 7, (Vo- 196).

65. *Clypeola jonthlaspi* L.

(an, M, S, T), Section, 2, (Vo-56).

66. *Conringia perfoliata* (Crantz) Link.

(an, M, S, T), Section, 3, (Vo-197).

67. *Erysimum repandum* L.

(an, M, S, T), Section, 3, (Vo-127).

68. *Isatis Lusitanica* L.

(an, M, S, T), Section, 3, 4, (Vo-133).

69. *Lepidium draba* L.

(an, M, I, T, S), Section, 3, (Vo-198).

70. *Lepidium sativum* L.

(an, M, I, S, T), Section, 4, (Vo-5).

71. *Nasturtium officinale* R.Br.

(pe, M, I, S, T), Section, 1, 3, 4, 7(Vo-159, 447)

72. *Sisymbrium irio* L.

(an, M, S, T), Section, 3, 4, 6, (Vo-229).

73. *Sisymbrium officinale* (L.) Scop.

(an, M, S, T), Section, 1, 3, 7, (Vo-54)

74. *Sinaps arvensis* L.

(an, M, I, S, T) Section, 4, 5, 6, (Vo-105).

16. CAMPANULACEAE

75. *Mechauxia nuda* A.DC.

(bi, M, S), Section, 1, 4, (Vo-199).

17. CAPPARIDACEAE

76. *Capparis spinosa* L.

(Sh pe, M, I, S, T), Section, 2, 3, 4, 7(Vo-134)

18. CAPRIFOLIACEAE

77. *Cephalaria syriaca* (L.) Schrad.

(an, M, I, S, T), Section, 1, 2, 3, 4, 5, 8, (Vo- 232)

78. *Pterocephalus kurdicus* Vaill. ex Adans.

(Pe, M, I, T), Section, 1, 2, 4, 5, 6, 7, (Vo-6)

79. *Valerianella vesicaria* (L.) Moench.

(an, M, I, T), Section, 3, 4, 5, (Vo-17).

19. CARYOPHYLLACEAE

80. *Dianthus strictus* Banks et Sol.

(pe, M, T, I), Section, 3, 6, (Vo-28).

81. *Minuartia hamata* (Hauskn.) Mattf.

(an, M, T), Section, 2, 3, 4, (Vo-230).

82. *Silene aegyptiaca* (L.) L.f.

(an, M, T), Section, (Vo- 41).

83. *Vaccaria hispanica* Mill.

(an, M, S, T, I), Section, 3, 4, 5, (Vo- 160)

20. CISTACEAE

84. *Helianthemum ledifolium* (L.) Mill.

(an, M, I, S, T), Section, 2, 3, (Vo- 67).

21. CONVULVULACEAE**85. *Convolvulus arvensis* L.**

(pe, M, I, S, T), Section, 2, 3, 4, (Vo-200, 440).

86. *Convolvulus stachydifolius* L.

(pe, M, I, S, T), Section, 3, 5, (Vo- 106).

87. *Cuscuta* sp.

(an, M, S, T, I), Section, 3, (Vo- 135).

22. CRASSULACEAE**88. *Rosularia radiceflora* Boriss.**

(pe, M, T), Section, 2, 3, (Vo- 136).

89. *Umbilicus horizontalis* (Guss.) DC.

(pe, M, S, T), Section, 1, 2, 3, 4, 5, 6, 7, 8, (Vo- 201, 266)

23. CUCURBITACEAE**90. *Bryonia multiflora* L.**

(pe, M, I, S, T), Section, 3, (Vo-231).

91. *Citrullus colocynthis* (L.) Schrad.

(pe, M), Section, 3, 5, (Vo- 161, 340).

24. CUPRESSACEAE**92. *Cupressus sempervirens* L. var. *Pyramidata***

(Mill.) Loudon

(Tr, M, I, S, T), Section, 1, 3, 5, (Vo-107).

93. *Thuja orientalis* (L.) franco.

(Tr, M), Section, 1, 2, 3, 6, (Vo-539)

25. CYPERACEAE**94. *Carex diluta* M.Bieb.**

(pe, M, I, S, T), Section, 2, 3, 8, (Vo-738)

95. *Carex pachystylis* J.Gay.

(pe, M, I, T), Section, 2, 3, 6, (Vo-198)

96. *Cyperus longus* L.

(pe, M, I, S, T), Section, 5, 7, (Vo- 138).

97. *Cyperus rotundus* L.

(pe, M, S, T, I), Section, 3, 7, (Vo- 202).

26. EUPHORBIACEAE**98. *Andrachne telephoides* L.**

(pe, M, I, S, T), Section, 1, 3, 5, 6, (Vo- 139).

99. *Andrachne aspera* Spreng.

(pe, M, I, S, T), Section, 1, 3, 6, (Vo- 18, 272).

100. *Chrozophora tinctoria* (L.).

(an, M, I, S, T), Section, 2, 3, 4, 5, 6, 7(Vo-18).

101. *Euphorbia alepica* L.

(an, M, S, I, T), Section, 1, 3, 6, (Vo- 163).

102. *Euphorbia helioscopia* L.

(an, M, I, S, T), Section, 2, (Vo- 233).

103. *Euphorbia macroclada* Boiss.

(pe, M, S, I, T), Section, 2, 6, (Vo- 233).

104. *Euphorbia falacta* L.

(an, M, I, S, T), Section, 4, 6, (Vo- 30).

105. *Euphorbia petiolata* Banks & Sol.

(an, M, S, T) , Section, 3, 4, (Vo- 108).

27. FABACEAE (LEGUMINOSAE)**106. *Alhagi graecorum* Boiss.**

(Pe, M, I, T, S), Section, 2, 3, 4, (Vo- 203).

107. *Astragalus gossypinus* L.

(pe, M, T, I, S), Section, 1, 6, (Vo- 164, 278).

108. *Astragalus spinosus* (Forssk.) Muschl.

(pe, M), Section, 1, 2, 6, (Vo- 82, 449).

109. *Astragalus hamosus* L.

(an, M, I, T, S), Section, 3, (Vo- 234).

110. *Cicer arietinum* L.

(an, M, I, T, S) , Section, 2, 4, 5, 6, 7, (Vo- 83).

111. *Glycyrrhiza glabra* L.

(pe, I, T, S), Section, 1, 6, 7, (Vo- 68).

112. *Hippocrepis unisiliqusa* L

(an, M, I, T, S), Section, 3, (Vo- 165).

113. *Hymenocarpus circinnatus* (L.) Savi

(an, M, I, T, S), Section, 3, (Vo- 43).

114. *Lathyrus aphaca* L.

(an, M, I, T), Section, 3, 4, (Vo- 140, 270).

115. *Lathyrus inconspicuus* L.

(an, M, S, T), Section, 5, (Vo- 204).

116. *Lathyrus annus* L.

(an, I, T), Section, 3, 4, (Vo- 31).

117. *Medicago minima* (L.) L.

(an, M, S, T), Section, 2, 3, 4, (Vo- 166, 450).

118. *Medicago orbicularis* (L.) Bartal.

(an, M, I, T, S), Section, 2, 3, 4, (Vo- 109, 430).

119. *Medicago polymorpha* L.

(an, M, I, T, S), Section, 3, (Vo- 56).

120. *Medicago radiate* L.

(an, M, I, T), Section, 3, 4, (Vo- 235).

121. *Medicago lupulina* L.

(an, M, S, T, I), Section, (Vo- 69).

122. *Medicago sativa* L.

(an, M, I, S, T), Section, 6, (Vo- 19).

123. *Medicago rigidula* (L) all.

(an, M, T, I, S), Section, 1, (Vo- 7).

124. *Melilotus indica* (L.) All. , Fl. Pedem.

(an, M, S, T, I), Section, 4, (Vo- 205).

125. *Onobrychis caput-galli* (L.) Lam.

(an, M, I, T, S), Section, 3, 4, (Vo- 141).

126. *Pisum sativum* L.

(an, M, I, T, S), Section, 3, 4, 5, (Vo- 167).

127. *Prosopis farcta* (Banks & Sol.) J.F.Macbr.

(pe, M, I, T, S), Section, 1, 2, 3, 4, 6, 7, (Vo- 32, 431).

128. *Scorpiurus muricatus* L.

(an, M, I, T, S), Section, 1, 2, 3, 4, 5, 6, 7(Vo- 92)

129. *Trifolium campestre* Schreb.

(an, M, I, S, T), Section, 2, 6, (Vo- 44).

130. *Trifolium resupinatum* L.

(an, M, S, T), Section, 3, 4, 6, (Vo- 110, 455).

131. *Trifolium grandiflorum* Schreb.

(an, M, I, S, T), Section, 6, (Vo- 45).

- 132. *Trifolium purpureum*** Loisel.
(an, M, I, S, T), Section, 1, 2, 3, 4, 5, (Vo- 142).
- 133. *Trifolium repens*** L.
(an, M, I, T, S), Section, 6, (Vo- 206).
- 134. *Trifolium stellatum*** L.
(an, M, I, T, S), Section, 1, 2, 3, 4, 5, 6, (Vo- 168, 432).
- 135. *Trifolium hirtum*** L.
(an, M, S, T), Section, 2, 3, 4, 5, 7, (Vo- 56).
- 136. *Trifolium tomentosum*** L.
(an, M, I, T), Section, 3, 4, 5, (Vo- 237).
- 137. *Vicia narbonensis*** L.
(an, M, I, S, T), Section, 3, (Vo- 69).
- 138. *Vicia sativa*** L.
(an, M, I, S, T), Section, 4, 5, 6, (Vo- 143, 371).
- 139. *Vicia faba*** L.
(an, M, I, S, T), Section, 4, 5, 6, (Vo- 221).
- 28. FAGACEAE**
- 140. *Quercus aegilops*** L.
(Tr, M, I, S, T), Section, 1, 2, 3, 4, 5, 6, 6, 7, (Vo- 20, 462).
- 141. *Quercus infectoria*** Oliv.
(Tr, M, I, S, T), Section, 1, 2, 3, 4, 5, 6, 7, (Vo- 207, 279).
- 29. GENTIANACEAE**
- 142. *Gentiana olivieri*** Griset.
(pe, M, I, T), Section, 3, 4, (Vo- 111).
- 30. GERANIACEAE**
- 143. *Erodium cicutarium*** (L.) L'Hér.
(an, M, S, T), Section, 3, (Vo- 33).
- 144. *Gernium molle*** L.
(pe, M, S, T), Section, , (Vo- 543)
- 145. *Gernium rotundifolium*** L.
(an, M, I, S, T), Section, 3, 6, (Vo- 238).
- 31. HYPERICACEAE (GUTTIFERAE)**
- 146. *Hypericum triquetrifolium*** Turra., Farsetia nov Pl.
(pe, M, I, S, T), Section, 1, 2, 3, 4, 5, 6, (Vo-8).
- 32. IRIDACEAE**
- 147. *Gladiolus atrovioleaceus*** Boiss.
(pe, M, I, S, T), Section, 2, 3, (Vo- 46).
- 148. *Gladiolus italicus*** Mill.
(pe, M, I, S, T), Section, 2, 3, 6, (Vo- 149).
- 33. IXIOLIRIONACEAE**
- 149. *Ixiolirion tataricum*** (Pall.) Schult & Schult.f.
(pe, M, I, S, T), Section, 1, (Vo- 482)
- 34. JUGLANDACEAE**
- 150. *Juglans regia*** L.
(Tr, M, I, S, T), Section, 3, 6, (Vo- 208).
- 35. JUNCACEAE**
- 151. *Juncus bufonius*** L.
(an, M, I, T), Section, 3, (Vo- 58).
- 152. *Juncus rigidus*** Desf.
(pe, M, I, T, S), Section, 1, 7, 8, (Vo- 170)
- 36. LAMIACEAE (LABIATAE)**
- 153. *Ajuga chamaepitys*** (L.) Schreb.
(Pe, M, I), Section, 1, 3, 6, (Vo- 47).
- 154. *Eremostachys laciniata*** (L.) Bunge
(pe, M, I), Section, 3, 4, 5, (Vo- 112).
- 155. *Lamium amplexicaule*** L.
(an, M, I, S, T), Section, 2, 3, 4, 6, (Vo- 39).
- 156. *Marrubium cuneatum*** Banks & Sol.
(pe, M, I, T), Section, 2, 4, 6, (Vo- 86).
- 157. *Mentha longifolia*** (L.) L.
(pe, M, I, T), Section, 1, 2, 4, 5, 6, 7, (Vo- 171).
- 158. *Molucella laevis*** L.
(Pe, M, I, T), Section, 2, 5, (Vo-209).
- 159. *Phlomis kurdica*** Rech.f.
(pe, M, I, S, T), Section, 4, (Vo-470).
- 160. *Salvia indica*** L.
(pe, M, I, T), Section, 1, 2, 3, (Vo- 69).
- 161. *Teucrium polium*** L.
(an, M, S, T, I), Section, 1, 2, 3, 4, 5, (Vo- 85).
- 162. *Vitex agnus-castus*** L.
(Sh, M, S, T, I) ,Section, 1, 4 , (Vo- 172).
- 163. *Ziziphora capitata*** L.
(an, M, I, S, T), Section, 3, 4, (Vo- 113).
- 37. LILIACEAE**
- 164. *Gagea*** sp.
(pe, M), Section, 3, (Vo- 682)
- 165. *Scilla autumnalis*** L.
(pe, M), Section, 1, 2, 3, 4, (Vo-127, 564)
- 38. LINACEAE**
- 166. *Linum corymbosum*** Reichb.
(an, M, I, S, T), Section, 2, 3, (Vo- 565)
- 167. *Linum mucronatum*** Bertol.
(pe, M, I, S, T), Section, 1, 2, (Vo-392)
- 39. MALVACEAE**
- 168. *Alcea kurdica*** Alef.
(pe, M, I, S, T), Section, 1, 2, 3, 4, 5, 6, 7, (Vo- 210, 436).
- 169. *Malva neglecta*** Wallr.
(pe, M, I, S, T), Section, 1, 2, 3, 4, 5, 6, 7, (Vo- 240. 472).
- 40. MELIACEAE**
- 170. *Melia azedarach*** L.
(Tr, M), Section, 3, (Vo- 145).
- 41. MORACEAE**
- 171. *Ficus carica*** L.
(Sh, M, I, S, T), Section, 1, 3, 4, (Vo-9, 376).
- 172. *Morus alba*** L.

(Tr, M, I, S, T), Section, 1, 3, 4, 6, (Vo- 21).

42. MYRTACEAE

173. *Eucalyptus* sp L'Hér.

(Tr, M, S, T, I), Section, 1, 2, 3, 6, (Vo- 211).

43. OLEACEAE

174. *Olea europaea* L.

(Sh, M, S, T, I), Section, 2, 3, (Vo- 114).

44. ORCHIDACEAE

175. *Orchis collina* Banks & Sol. ex Russell.

(pe, M, I, S, T), Section, 4, (Vo- 241).

45. OROBANCHACEAE

176. *Orobanche aegyptiaca* Pers.

(an, M, I, S, T), Section, 2, 4, (Vo- 146).

46. PAPAVERACEAE

177. *Papaver decaisnei* Hochst. & Steud. ex Elkan.

(an, M, I, S, T), Section, 1, 3, 4, 6, (Vo- 22, 476).

178. *Papaver fugax* Poir.

(an, M, I, T), Section, 1, 2, 3, 4, 6, 7, (Vo- 212).

47. PINACEAE

179. *Pinus halepensis* Mill.

(Tr, M), Section, 1, 2, 3, 4, (Vo- 215, 480).

48. PLATANACEAE

180. *Platanus Orientalis* L.

(Tr, M, I, S, T), Section, 3, 5, (Vo- 149).

49. PLANTAGINACEAE

181. *Plantago major* L.

(Pe, M, I, S, T), Section, 6, (Vo- 175).

182. *Plantago cretica* L.

(an, M), Section, 3, (Vo-118).

183. *Plantago lanceolata* L.

(an, M, I, S, T), Section, 2, 4, 5, 7, (Vo- 243).

184. *Veronica anagallis* aquatic L.

(an, M, I, T), Section, 3, 4, (Vo- 1).

50. PLUMBAGINACEAE

185. *Plumbago europae* L.

(pe, M, I, S, T), Section, 2, 4, 6, (Vo- 12, 486).

51. POACEAE (GRAMINEAE)

186. *Aegilops columnaris* Zhuk.

(an, M, S, T, I), Section, 2, (Vo- 34).

187. *Avena fatua* L.

(an, M, I, S, T), Section, 2, 3, 4, 5, 7, (Vo- 216).

188. *Bromus tomentellus* Boiss.

(pe, M, I, S, T), Section, 3, 4, 7, (Vo- 60).

189. *Bromus tectorum* L.

(an, m, I, S, T), Section, 2, 3, 5, (Vo-176, 281).

190. *Bromus danthoniae* L.

(pe, M, S, T), Section, 2, 3, 5, (Vo- 72).

191. *Catabrosa aquatic* (L.) P. Beauv.

(pe, M, S, T), Section, 4, (Vo- 48).

192. *Cynodon dactylon* (L.) Pers

(pe, M, I, S, T) , Section, 1, 2, 3, 4, 5, 6, 7, (Vo- 119, 391).

193. *Echinaria capitata* (L.) Desf.

(an, M, I, S, T), Section, 3, 7, (Vo- 23).

194. *Echinochloa colonum* L.

(an, M, S, T, I), Section, 6, (Vo- 61).

195. *Hordeum glaucum* Steud.

(an, M, I, T, S), Section, 1, 2, 3, 5, (Vo- 150).

196. *Hordeum spontaneum* K.Koch.

(an, M, I, S, T), Section, 1, 2, 3, 4, 5, (Vo- 217).

197. *Hordeum vulgare* L.

(an, I, S, T), Section, 3, 4, 5, (Vo- 49).

198. *Hordeum bulbosum* L.

(Pe, m, I, S, T), Section, 3, 4, (Vo-244).

199. *Imperata cylindrica* (L.) P.Beauv.

(Pe, M, I, S, T), Section, 3, 4, (Vo-699)

200. *Lolium persicum* Boiss. & Hohen.

(an, M,T), Section, 7, (Vo-62).

201. *Lolium rigidum* Gaud.

(an, M, I, S, T), Section, 4, (Vo-13).

202. *Phalaris minor* Retz.

(an, M, S, T, I), Section, 4, 5, 6, (Vo- 177, 485).

203. *Phragmites australis* (Cav.) Trin. ex Steud.

(pe, M, I, S, T), Section, 2, 3, 7, (Vo- 120, 398).

204. *Poa bulbosa* L.

(pe, M, I, S, T), Section, 2, 3, 5, (Vo- 73).

205. *Poa annua* L.

(pe, M, I, S, T), Section, 3, 6, (Vo-84).

206. *Sorghum halepensis* (L.) Pers

(pe, M, I, S, T), Section, 3, 4, 6, (Vo-121).

207. *Polypogon monspeliensis* (L.) Desf.

(an, M, M, I), Section, 6, (Vo-63).

208. *Triticum durum* Desf.

(an, M, I, T, S), 3, 4, 5, 6, 7, (Vo-218, 282).

52. POLYGONACEAE

209. *Polygonum aviculare* L.

(an, M, I, T), Section, 3, (Vo-178).

210. *Rumex crispus* L.

(pe, M, I, T), Section, 1, 2, 3, 4, 5, (Vo-245).

211. *Rhuem ribes* L.

(Pe, M, I, T), Section, 6, (Vo-24).

53. PORTULACEAE

212. *Portulace oleraceae* L.

(an, M, I, S, T), Section, 4, 6, (Vo-122).

54. PRIMULACEAE

213. *Anagallis arvensis* L.

(an, M, I, S, T), Section, 1, 2, 4, 5, 6, (Vo-246).

55. PUNICACEA

214. *Punica granatum* L.

(Sh, M, I, T), Section, 1, 2, 3, 4, 5, 7, (Vo-179).

56. RANUNCULACEA

215. *Adonis aestivalis* L.

- (an, M, S, T), Section, 2, 3, 4, 5, (Vo-35).
- 216. *Adonis microcarpa* DC.**
(an, M, I, S, T), Section, 1, 2, 3, 4, 5, 6, 7, (Vo-123, 400).
- 217. *Anemone coronaria* L.**
(pe, I, S, T), Section, 1, 2, 3, 4, 5, 6, 7, (Vo- 64).
- 218. *Ranunculus arvensis* L.**
(an, M, I, S, T), Section, 1, 2, 3, 6, (Vo- 14).
- 219. *Ranunculus macrorhynchus* Boiss.**
(an, M, S, T), Section, 1, 2, 5, 6, (Vo-36, 490).
- 57. RHAMNACEAE**
- 220. *Paliurus spina-christi* Mill.**
(Sh, M, S, T, I), Section, 2, (Vo-219).
- 58. ROSACEAE**
- 221. *Crataegus azarolus* L.**
(Tr, M, I, S, T), 1, 2, 3, 4, 5, 6, 7 (Vo-180).
- 222. *Crataegus monogyna* L**
(Tr, M, I, S, T) Section, 6, (Vo- 124).
- 223. *Potentilla reptans* L.**
(pe, M, I, S, T), Section, 6, (Vo-51).
- 224. *Poterium sanguisorba* L.**
(pe, M), Section, 2, 3, 6, (Vo-247, 500).
- 225. *Prunus amygdalus* Batsch.**
(Tr, M, I, S, T), Section, 3, (Vo-212).
- 226. *Prunus arabica* (Oliv.) Meikle.**
(Sh, M, I, S, T), Section, 1, 2, 3, 4, 5, (Vo-213).
- 227. *Prunus argentea* (Lam.) Rehd.**
(Sh, M, I, S, T), Section, 2, 3, 4, (Vo- 115).
- 228. *Prunus microcarpa* C.A.Mey.var. *pubescens* (Bornm.) Meikle.**
(Sh, M, I, S, T), Section, 1, 2, 3, 4, 5, (Vo-10).
- 229. *Pyrus syriaca* Boiss.**
(Tr, M, I, S, T), Section, 4, (Vo-181,477).
- 230. *Pyrus communis* Boiss.**
(Tr, M, I, T, S), Section, 3, 6, (Vo- 58).
- 231. *Rosa canina* L.**
(Sh, M, I, S, T), Section, 6, (Vo- 70).
- 232. *Rubus sanctus* Schreb.**
(Sh, M, S, I), Section, 1, (Vo- 242).

59. RUBIACEAE

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- 233. *Callipeltis cucullaris* (L.) DC.**
(an, M, I, T, S), Section, 3, 4, (Vo- 147).
- 234. *Galium aparine* L.**
(an, M, I, T, S), Section, 3, 4, 5, 6, 7, (Vo-59).
- 235. *Galium setaceum* Lam. subsp.**
(an, M, I, T, S), Section, 3, 4, (Vo-182).
- 236. *Galium tricorntutum* Dandy.**
(an, M, I, T, S), Section, 4, (Vo-25).
- 237. *Sherardia arvensis* L.**
(an, M, I, S, T), Section, 5, 6, (Vo-87).
- 238. *Theligonium cynocrambe* L.**
(an, M, S, T, I), Section, 1, 3, 4, (Vo- 162).
- 60. SALICACEAE**
- 239. *Populus alba* L.**
(Tr, M, I, S, T), Section, 3, 6, (Vo-379).
- 240. *Salix acmophylla* Boiss.**
(Tr, M, I, S, T), Section, 1, 3, 6, (Vo-116).
- 61. SOLANACEAE**
- 241. *Solanum S. nigrum* L.**
(an, M, I, T)Section, 4, 5, (Vo- 71).
- 62. TAMARICACEAE**
- 242. *Tamarix ramosissima* Ledeb.**
(Sh, M, I), Section, 7, (Vo-183).
- 63. TYPHACEAE**
- 243. *Typha lugdunensis* P. Chab.**
(pe, M, I, T), Section, 3, 7, (Vo-148).
- 64. ULMACEAE**
- 244. *Celtis tournifourtii* Lam.**
(Tr, M, I, S, T), Section, 1, 2, 3, 4, 5, 6, 7, (Vo-243, 479).
- 65. URTICACEAE**
- 245. *Urtica pilulifera* fera.**
(an, M, S, T, I), Section, 3, (Vo- 11)
- 66. VITACEAE**
- 246. *Vitis vinifera* L.**
(pe, M, I, T), Section, 1, 3, 4, 5, 6, (Vo- 117)
- 67. ZYGOPHYLACEAE**
- 247. *Tribulus terrestris* L.**
(an, M), Section, 3, 6, (Vo- 184, 293).

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