

TERRESTRIAL FLORA DIVERSITY IN JABAL MOUSSA : PRELIMINARY BIODIVERSITY ASSESSMENT &
SITE DIAGNOSIS

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Terrestrial Flora Diversity in Jabal Moussa: Preliminary Site Diagnosis.
1st Site evaluation report presented to JABAL MOUSSA Association

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I. INTRODUCTION

The Circum-Mediterranean Basin is considered as a reservoir of plant diversity and has been shown to contain hot spots that are recognized in some countries as relicts. Located on the Eastern shores of the Mediterranean Basin and at the heart of one of the 34 recognized world 'hotspots' for conservation priority, Lebanon harbors 2600 plant species with a high percentage of endemic plant species (12%) among which 221 are broad endemics and 90 are narrow endemics. The noted diversity is mostly the result of the physiography of the landscape, the country's location at crossroads between continents and impacts of human practices over the centuries (fire setting, clear-cutting, agricultural practices, heavy browsing and grazing).

Recognizing the threats facing the vegetation cover and plant specificity, the government has been mainstreaming most of its conservation efforts towards the protection and conservation of important ecosystems and forest communities since the signature and ratification of the Convention on Biological Diversity. Thus in-situ conservation and sustainable management of biodiversity figured at the top of the listed priorities in national action plan. Today, there are about 40 protected sites covering 1.8% of the Lebanese territory among which 9 are nature reserves. Six of these natural reserves represent terrestrial ecosystems among which 3 forests of cedar [Al-Shouf, Ehden and Tannoruine], 1 of mixed fir and cedar [Qamoua], 1 of pine [Bentael] and 1 old juniper forests [Yammouneh]; two cover coastal and marine ecosystems [Tyr and Palm Islands], while one gathers patches mosaic of terrestrial ecosystems and marshes [Amiq].

It is quite obvious that in-situ conservation in Lebanon, represented by a network of various terrestrial and marine ecosystems, lacks the representation of deciduous forest types such as the Turkey oak and other mixed deciduous tree species. These forest types represent ecosystem relicts and they are strictly localized in the country. Some of them represent southern most limit of deciduous tree species such as the Jabal Moussa and Chouane region.

II. RATIONALE

Jabal Moussa, extending on 1250 ha and over altitudes ranging from 500 to 1500 meter, gathers Mediterranean, Montane and Supra-Mediterranean vegetation series. The region is home to more than 15 tree species and 200 plant species (Annex 1). The mountainous area, dominating two rivers [Nahr Eh Dahab and Nahr Ibrahim], reflects a typical Mediterranean landscape sheltering mosaics of plant communities. These communities represent nature refuge harbouring mixed and / or pure patches of *Ostrya carpinifolia* Scop., *Fraxinus ornus* L. and *Styrax officinalis* L. populations and *Quercus cerris* L. and *Q. callipinos* Oliv. and *Pinus brutia* Ten. tree species. The first two species are spontaneous, endemic

and occupy limited surface area in Lebanon. These are found in Nahr Ibrahim, Nahr EL Deheb, Ehmej, Mchati et Wadi Eljamajem. The *O. carpinifolia* stands are recognized for their biogeographic value, being the Southernmost limit of the species in Eastern Mediterranean. Thus the site can be acknowledged for its special value as a repository for old growth tree specimens of storax, pistachio, alder and hop horn-beam. These tree species, well preserved in Jabal Moussa, have been subject to wood cutting for fire wood in most of other Lebanese forests.

The mountain, in its north and west and south and south eastern, is imprinted by historical records showing anthropogenic activities and long-history of human interactions with forest in the Mediterranean region. These human activities; transhumance, agriculture, felling of the forests, grazing, fire, terracing, urbanization, and pollution; have sculptured the past, present and will leave prints on the future landscape. The area can be considered as a mountainous repository for different plant associations harbouring important birds, mammals and insects species.

Being of high biological, landscape and socio-cultural values, the Mountain calls for an urgent need for the conservation and sustainable management of natural resources to leverage their direct and indirect use values.

III. INVENTORIES & SURVEYS

III.1. MATERIALS & METHODS ADOPTED

The sampling approach adopted to assess the diversity richness in the area and to complete the checklist developed through the period of work was stratified sampling. The quadrats were defined in different areas of Jabal Moussa area relying on the various physical and biotic parameters found.

A total of 20 visits were made to the region among which 8 were specific to execute a floristical releve to assess the biodiversity in different regions of the Jabal and to estimate the diversity indice. The first visit targeted the reconnaissance of the different habitats and ecosystems found in the area as well as the performing of a preliminary checklist of the plant found. Previous to the field visit an inventory from the existing flora books has been performed in order to set a preliminary diagnosis on the importance of the areas and to have a clear vision on deciding about the sampling strategy.

Table 1. Geographical Position and region of the selected quadrats

	DATE	QUADRAT	REGION	ALTITUDE	LONGITUDE	LATITUDE
114	July 6, 2008	MC1	Mchati – Shammis	1121	34 03.062	035 45.641
109	July 6, 2008	MC2	Mchati – Al Hebsh	1224	34 03.149	035 45.649
111	July 6, 2008	MC3	Mchati – Al Sahleh	1309	34 03.220	035 45.585

118	July 11, 2008	MR1	Maou'al Al Ramieh	1306	34 03.266	035 45.442
122	July 11, 2008	MR2	Maoul Al-Ramieh-Kornet El-Bayda	1234	34 03.277	035 45.177
123	July 11, 2008	MR3	Maoul Al-Ramieh -Al-Bayada	1167	34 03.271	035 45.035
125	July 12, 2008	YA1	Towards Yahchouch	1332	34 03.669	035 45.258
126	July 12, 2008	YA2	Towards Yahchouch	1234	34 03.740	035 45.222

Table 2. Geographical Position and region of important sites identified during field visit in JM

WAYPOINTS	REGION	ALTITUDE	LONGITUDE	LATITUDE
DATE: April 23, 2008				
13	Orchidaceae	1310	N 34 03.216	E 035 45.581
25	Puschkinia pockets	1319	N 34 03.419	E 035 45.363
43	Berket el Rami	1283	N 34 03.319	E 035 45.299
58	Cephalanthera	1330	N 34 03.134	E 035 45.237
DATE: May 29, 2008				
67	Baydar el Chawk	1452	N 34 03.409	E 035 46.656
79	Broken Rocks	1525	N 34 03.463	E 035 46.217
80	Towards Bir El Misbak	1520	N 34 03.460	E 035 46.207
81	Bir El Misbak	1529	N 34 03.453	E 035 46.202
82	Orchis comperiana	1513	N 34 03.445	E 035 46.166
85	Vista point:Beirut a city floating on water	1534	N 34 03.457	E 035 46.022
86	Ma3bour el Laouz	1531	N 34 03.458	E 035 46.024
89	Baidar for Charcoal production	1546	N 34 03.488	E 035 45.903
90	Vista Point:Byblos city of the Phoenicians	1516	N 34 03.525	E 035 45.884
98	Vista point:Harissa	1446	N 34 03.479	E 035 45.672
101	Place of the Pistachio	1344	N 34 03.398	E 035 45.401

III.2.SITE DIAGNOSIS

III.2.1 BIODIVERSITY RICHNESS

Field expeditions and biodiversity surveys executed in 2007, 2008 and 2009 revealed the presence of more than 20 tree and shrubs species and more than 170 plant species of various importances at the local, national and regional level.

The preliminary inventory initiated in May 2007 for the Jabal Moussa region and its buffer zones listed 91 plant species among which 3 tree species (Lebanese Floras). The additional number of species (Total of 171 plant species) observed during field expeditions performed in spring and autumn 2007 and spring 2008 still reflects insufficient botanical assessment studies executed by missionary in early 19 centuries while developing national floras.

The diversity indices recorded high numbers varying between 25 and 65 plant species / 400 m² (Table 3). This observed value is one among the highest recorded in different sites in Lebanon. Highest biodiversity indices were recorded at high peaks and in open forest habitats, while the lowest was observed on bed rocks. These bedrocks are shelter to specific plant species which will be investigated in the more specified project which will target the area as a Biosphere Reserve.

Table 3. Diversity richness in 400 m²

Region	Sub-region	Habitat/land cover	Diversity indices
Mchati	Shammis	Slopes/shrubland	44
	Al-Hebsh	Slopes/shrubland	48
	Al Sahleh	Mountain peak/open forest	65
Maou'al Al Ramieh		Slopes/shrubland	55
	Kornet Al Bayda	Slopes/shrubland/open forest	50
	Al Bayada	Slopes shrubland	49
Yahshoush			55
		Slopes/Bedrocks	25

III.2.2. Conservation value

The surveys executed during the past two years (2007 and 2008) showed to be promising to find large number of species. It revealed that in total the site is home to 11 endemic species among which 4 are

specific to Lebanon and the other 7 are endemic to Lebanon, Syria and/or Turkey. Nine observed species figure on the list of species to be protected. Few of the plants are categorized as peculiar to the Mediterranean region (Table 4). The richness in bulbous species, among which many are of broad and narrow endemism, pinpoints the importance of conserving the area and considers it as a refuge for species listed nationally and internationally of great importance.

Table 4. Conservation and biological importance of the observed species

<p>To be protected</p> <p><i>Crocus ochroleucus</i> Boiss. & Gaill <i>Cyclamen coum</i> Mill. <i>Gladiolus segetum</i> Ker-Gawler <i>Iris histrio</i> Reich. <i>Paeonia mascula</i> (L.) Mill. <i>Epipactis</i> sp. <i>Pentapera sicula libanotica</i> Barbey. <i>Puschkinia scilloides</i> Adams. var. <i>libanotica</i> (Zucc.) Boiss. <i>Staehelina lobellii</i> DC.</p> <p>Peculiar to Mediterranean countries</p> <p><i>Galium canum</i> Requier. <i>Geranium libani</i> Davis <i>Helichrysum sanguineum</i> (L.) Kostel <i>Hypericum thymifolium</i> Banks & Sol. <i>Lamium truncatum</i> Boiss.</p>	<p>Endemic to Lebanon</p> <p><i>Asperula libanotica</i> Boiss. (End Lebanon) <i>Cyclamen libanoticum</i> Hildebr. <i>Origanum libanoticum</i> Boiss. <i>Pentapera sicula</i> (Guss) Klotzsch. var. <i>libanotica</i> C. & W. Barbey. (Nahr Ibrahim)</p> <p>Endemic Lebanon, Syria and Turkey</p> <p><i>Centaurea cheirolopha</i> (Fenzl.) Wagenitz <i>Quercus cerris</i> L. var. <i>pseudo-cerris</i> (Boiss.) Boiss. (Amanus) <i>Galium libanoticum</i> Herd. <i>Rubia aucheri</i> Boiss. <i>Smyrniium connatum</i> Boiss & Ky.</p> <p>Endemic Lebanon and Syria</p> <p><i>Saponaria bargylia</i> Gomb. <i>Malus trilobata</i> (L.) C. K. Schn.</p>
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The area host plants listed in CITES annexes. The next developed applied research programme will investigate on the Orchid species and Ophrys species and bulbous plants found in Lebanon in addition to medicinal and aromatic plant species.

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Annex 1. Inventory of plant species in Jabal Moussa region and buffer zones (Mouterde, 1966)

	Plant name	Nahr Ibrahim	Chouène (Chahtoul)	Snoubar	Yahchouch	Ghbalé	Nahr dahab	Mchati
1	<i>Erica manipuliflora</i>	x						
2	<i>Samolus valerandi</i>	x						
3	<i>Cyclamen coum</i>		x					
4	<i>Minuartia hybrida</i>	x	x					
5	<i>Minuartia mesogitana</i>	x						
6	<i>Arenaria leptoclados</i>	x						
7	<i>Stellaria media</i>	x						
8	<i>Silene papillosa</i>	x						
9	<i>Silene nocturna</i>	x						
10	<i>Dianthus orientalis brachyodontus</i>	x						
11	<i>Cerastium comatum</i>		x					
12	<i>Cerastium brachypetalum</i>		x					
13	<i>Silene damascene</i>		x					
14	<i>Silene juncea pallida</i>		x					
15	<i>Dianthus orientalis brachyodontus</i>		x					
16	<i>Silene kotschyi</i>		x					
17	<i>Aristolochia altissima</i>		x					
18	<i>Quercus calliprinos</i>	x						
19	<i>Ostrya carpinifolia</i>		x					
20	<i>Alnus orientalis</i>	x						
21	<i>Ophrys iricolor</i>	x						
22	<i>Ophrys adonidis</i>	x						
23	<i>Ophrys lutea</i>	x						
24	<i>Ophrys attica</i>	x						
25	<i>Ophrys sintenesii</i>	x						
26	<i>Orchis morio</i>	x						
27	<i>Orchis tridentate</i>	x						
28	<i>Orchis simian</i>	x						

29	<i>Orchis italica</i>	x						
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Annex 1. Inventory of plant species in Jabal Moussa region and buffer zones (Mouterde, 1966) [Cont'd]

	Plant name	Nahr Ibrahim	Chouène (Chahtoul)	Yahchouch	Ghbalé	Nahr dahab	Mchati
30	<i>Neotinea intacta</i>			x			
31	<i>Crocus vitellinus</i>	x					
32	<i>Tamus communis</i>	x					
33	<i>Tamus orientalis</i>	x					
34	<i>Smilax aspera</i>	x					
35	<i>Tulipa aleppensis</i>		x				
36	<i>Ornithogalum platyphyllum</i>		x				
37	<i>Allium trifoliatum</i>		x				
38	<i>Lilium candidum</i>			x			
39	<i>Muscari comosum</i>	x					
40	<i>Allium nigrum</i>	x					
41	<i>Arisarum vulgare</i>	x					
42	<i>Hyparrhenia hirta pubescens</i>	x					
43	<i>Melica angustifolia</i>	x					
44	<i>Ephedra campylopoda</i>	x					
45	<i>Equisetum palustre</i>	x					
46	<i>Selaginella denticulate</i>	x					
47	<i>Lecoquia cretica</i>					X	
48	<i>Tordylium syriacum</i>	x					
48	<i>Eryngium falcatum</i>			x			
50	<i>Bupleurum fruticosum</i>			x			
51	<i>Daphne libanotica</i>		x				
52	<i>Euphorbia peplis</i>	x					
53	<i>Euphorbia arguta</i>	x					
54	<i>Euphorbia terracina</i>	x					
55	<i>Chrozophora tinctoria</i>	x					

56	<i>Geranium tuberosum</i>	x					
57	<i>Geranium purpureum</i>	x					
58	<i>Coronilla cretica</i>	x					
59	<i>Vicia narbonensis</i>			x			

Annex 1. Inventory of plant species in Jabal Moussa region and buffer zones (Mouterde, 1966) [Cont'd]

	Plant name	Nahr Ibrahim	Chouène (Chahtoul)	Yahchouch	Ghbalé	Nahr dahab	Mchati
60	<i>Lathyrus inermis</i> Var. <i>glabriusculus</i>		x				
61	<i>Trifolium echinatum</i>			x			
62	<i>Trigonella monspeliaca</i>		x				
63	<i>Medicago rigidula</i>		x				
64	<i>Dorycnium hirsutum</i>		x				
65	<i>Ononis diffusa</i>	x					
66	<i>Medicago blanchiana</i>	x					
67	<i>Melilotus italicus</i>	x					
68	<i>Crataegus monogyna</i>	x					
69	<i>Rosa dumetorum</i>			x			
70	<i>Rubus collinus</i>			x			
71	<i>Prunus mahaleb</i>		x				
72	<i>Saxifraga hederacea</i>	x					
73	<i>Alyssum murale</i>						x
74	<i>Thlaspi annuum</i>	x					
75	<i>Brassica cretica</i>	x					
76	<i>Nasturtium officinale</i>	x					
77	<i>Arabis verna</i>	x					
78	<i>Malcolmia chia</i>	x					
79	<i>Arabis sagittata</i>			x			
80	<i>Cardamine graeca</i>		x				

81	Malcolmia chia		x				
82	Fumaria judaica	x					
83	Fumaria gaillardotii	x					
84	Ranunculus paludosus		x	x			
85	Delphinium staphisagria	x					
86	Ranunculus asiaticus	x					
87	Ranunculus chius	x					
88	Thalictrum orientale	x					
89	Paeonia kesrouanensis		x				
90	Laurus nobilis	x		x			

Annex 2. List of tree species found in Jabal Moussa

1. *Acer syriacum* Boiss. & Gaill.
2. *Arbutus andrachne* L.
3. *Arceuthobium drupacea* (Labill.) Ant. & Ky.
4. *Cercis siliquastrum* L.
5. *Crataegus azarolus* L.
6. *Fraxinus ornus* L.
7. *Juniperus oxycedrus* L.
8. *Laurus nobilis* L.
9. *Malus trilobata* (Lab.) C.K.Schneider (To be checked again in Spring 2008)
10. *Ostrya carpinifolia* Scop.
11. *Phillyrea media* L.
12. *Pirus syriaca* Boiss.
13. *Pistacia palaestina* Boiss.
14. *Platanus orientalis* L.
15. *Prunus ursina* Ky.
16. *Quercus calliprinos* Webb.
17. *Quercus cerris* L. var. *pseudo-cerris* (Boiss.) Boiss.
18. *Quercus infectoria* Oliv.
19. *Sorbus torminalis* (L.) Crantz
20. *Styrax officinalis* L.

Annex 3. List of plant species observed during spring 2007, autumn 2008 and spring 2009 and those observed during the implementation of the 'Projet d'Assistance a la Protection de la Couverture Vegetale au Liban'.

1. *Acer syriacum* Boiss. & Gaill.
2. *Achillea* sp.
3. *Ajuga tridactylites* Ging. Ex. Ben.
4. *Alcea setosa* Boiss.
5. *Allium neapolitanum* Cyr.
6. *Allium* sp.
7. *Allium trifoliatum* Cyr.
8. *Amygdalus orientalis* Mill.
9. *Anacamptis pyramidalis* (L.) Rich.
10. *Andrachne telephiodes* L.
11. *Anthemis tinctoria*
12. *Arbutus andrachne* L.
13. *Arceuthos drupacea* (Labill.) Ant. & Ky.
14. *Aristolochia* sp.
15. *Asparagus acutifolius* L.
16. *Asperula libanotica* Boiss.
17. *Asphodelus microcarpus* Salzm. & Viv.
18. *Athyrium filix-femina*
19. *Atractylis comosa*
20. *Bellis sylvestris* Cyr.
21. *Blackstonia perfoliata* (L.) Huds.
22. *Bryonia* sp.
23. *Calamintha vulgaris* Boiss.
24. *Calycotome villosa* (Vahl.) Link.
25. *Campanula rapunculus* L.
26. *Carlina involucrata*
27. *Centaurea cheirolopha* (Fenzl.) Wagenitz
28. *Centaurea eryngoides*

29. *Centaurea hololeuca*
30. *Centaureum sp.*
31. *Centranthus longiflorus Stv.*
32. *Cephalaria keserwanensis*
33. *Cercis siliquastrum L.*

Annex 3. List of plant species observed during spring 2007, autumn 2008 & spring 2009 & those observed during the implementation of the 'Projet d'Assistance a la Protection de la Couverture Vegetale au Liban'. [Cont'd]

34. *Ceterach officinarum Lam. & DC.*
35. *Cichorium sp.*
36. *Cirsium diacantha*
37. *Cistus sp.*
38. *Clematis flammula L.*
39. *Colchicum decaisnei Boiss.*
40. *Colutea cilicica Boiss. & Bal.*
41. *Cotoneaster nummularia L.*
42. *Crataegus azarolus L.*
43. *Crataegus monogyna*
44. *Crepis sp.*
45. *Crocus ochroleucus Boiss. & Gaill*
46. *Crucianella sp*
47. *Cuscuta planiflora*
48. *Cyclamen coum Mill.*
49. *Cyclamen libanoticum Hildebr.*
50. *Cyclamen persicum Mill.*
51. *Cytisus sp.*
52. *Daucus carota*
53. *Delphinium staphisagria*
54. *Dianthus orientalis brachyodontus*
55. *Dianthus sp.*
56. *Dittrichia viscosa (L.) Greuter*
57. *Doronicum orientale Hoffm.*
58. *Dryopteris libanotica (Ros.) A. Christ.*
59. *Echinops villosus*

- 60. *Epipactis* sp.
- 61. *Erica* sp.
- 62. *Eryngium creticum* Lam.
- 63. *Eryngium falcatum*
- 64. *Eryngium glomeraum*
- 65. *Euphorbia helioscopia* L.
- 66. *Euphorbia* sp.
- 67. *Fibigia clypeata* (L.) Medik.

Annex 3. List of plant species observed during spring 2007, autumn 2008 and spring 2009 and those observed during the implementation of the 'Projet d'Assistance a la Protection de la Couverture Vegetale au Liban'. [Cont'd]

- 68. *Fraxinus ornus* L.
- 69. *Fritillaria* sp.
- 70. *Fumana* sp.
- 71. *Galium canum* Requien
- 72. *Galium libanoticum* Herd.
- 73. *Gallium pestalozzae*
- 74. *Gallium pruscence*
- 75. *Geranium libani* Davis
- 76. *Geranium pyrenaicum* Burm.
- 77. *Gladiolus segetum* Ker-Gawler
- 78. *Hedera helix* L.
- 79. *Helichrysum sanguineum* (L.) Kostel
- 80. *Hordeum bulbosum*
- 81. *Hypocoum imberbe* Sibth. & Sm.
- 82. *Hypericum bircinum* L.
- 83. *Hypericum lanugifolia* (!?)
- 84. *Hypericum thymifolium* Banks & Sol.
- 85. *Iris histrio* Reich.
- 86. *Jasminum fruticans*
- 87. *Juniperus oxycedrus* L.
- 88. *Lactuca* sp.
- 89. *Lamium truncatum* Boiss.
- 90. *Lathyrus niger* (L.) Bernh.

91. *Laurus nobilis* L.
92. *Linum* sp.
93. *Lonicera numularifolia*
94. *Lonicera* sp.
95. *Malcolmia chia*
96. *Malus trilobata* .(Lab.) C.K.Schneider
97. *Malus trilobata* .(Lab.) C.K.Schneider (To be checked again in Spring 2008)
98. *Mentha aquatica* L.
99. *Michauxia campanuloides*
100. *Micromeria* sp.

Annex 3. List of plant species observed during spring 2007, autumn 2008 and spring 2009 and those observed during the implementation of the 'Projet d'Assistance a la Protection de la Couverture Vegetale au Liban'. [Cont'd]

101. *Muscari* sp.
102. *Ononis natrix* L.
103. *Ononis spinosa*
104. *Origanum libanoticum* Boiss.
105. *Origanum syriacum* L.
106. *Ornithogalum libanoticum* (?!)
107. *Ornithogalum montanum* Cyr.
108. *Ostrya carpinifolia* Scop.
109. *Paeonia mascula* (L.) Mill.
110. *Pallenis spinosa*
111. *Pentapera sicula* (Guss) Klotzsch. var. *libanotica* C. & W. Barbey.
112. *Phillyrea media* L.
113. *Phlomis longifolia* Boiss. & Bl.
114. *Pirus syriaca* Boiss.
115. *Pistacia palaestina* Boiss.
116. *Platanus orientalis* L.
117. *Potentilla* sp.
118. *Prangos asperula*
119. *Primula vulgaris* Huds.
120. *Prunus ursina* Ky.
121. *Psoralea bituminosa* L.
122. *Pteridium aquilinum* (L.) Kubn.

123. *Puschkinia scilloides* Adams var. *libanotica* (Zucc.) Boiss.
 124. *Pyrus syriaca*
 125. *Quercus calliprinos* Webb.
 126. *Quercus cerris* L. var. *pseudo-cerris* (Boiss.) Boiss.
 127. *Quercus infectoria* Oliv.
 128. *Reseda* sp.
 129. *Rhamnus alaternus*
 130. *Rhamnus punctata* Boiss.
 131. *Rhamnus* sp.
 132. *Rhododendron ponticum* L.
 133. *Rhus coriaria* L.
 134. *Rosa* sp.
 135. *Rubia aucheri* Boiss.

Annex 3. List of plant species observed during spring 2007, autumn 2008 and spring 2009 and those observed during the implementation of the 'Projet d'Assistance a la Protection de la Couverture Vegetale au Liban'. [Cont'd]

136. *Rubia tenuifolia* d'Urv.
 137. *Rubus sanctus* Schreb.
 138. *Rubus tomentosus*
 139. *Ruscus aculeatus* L.
 140. *Salix libani* Bornm.
 141. *Salvia grandiflora* Etling.
 142. *Salvia* sp.
 143. *Salvia triloba* L.
 144. *Sambucus ebulus* L.
 145. *Sambucus nigra* L.
 146. *Saponaria bargylia* Gomb.
 147. *Scabiosa* sp.
 148. *Scutelaria* sp.
 149. *Sideritis* sp.
 150. *Silene cucubalis*
 151. *Silene juncea* Sibth. & Sm. var. *pallida* Boiss.
 152. *Silene* sp.
 153. *Smilax aspera* L.
 154. *Smyrniium connatum* Boiss & Ky.

155. *Sorbus torminalis* (L.) Crantz
156. *Spartium junceum* L.
157. *Stachys distans* Benth.
158. *Staebelina lobellii* DC.
159. *Sternbergia clusiana* Ker-Gawler
160. *Styrax officinalis* L.
161. *Tamus communis*
162. *Tanacetum cilicium*
163. *Teucrium divaricatum*
164. *Thesium humile*
165. *Trifolium stellatum* L.
166. *Umbilicus* sp.
167. *Urginea* sp.
168. *Valeriana dioscoridis* Sibth. & Sm.
169. *Verbascum* sp.
170. *Vicia tenuifolia* Roth.
171. *Viola odorata*

Annex 4. List of plant species collected during spring 2008.

1. *Alcea setosa* Boiss.
2. *Allium*
3. *Andrachne telephiodes* L.
4. *Anthemis tinctoria*
5. *Arbutus andrachne* L.
6. *Arceuthos drupacea* (Labill.) Ant. & Ky.
7. *Aristolochia* sp.
8. *Asparagus acutifolius* L.
9. *Asperula libanotica* Boiss.
10. *Athyrium filix-femina*
11. *Atractylis comosa*
12. *Bryonia* sp.
13. *Calamintha vulgaris* Boiss.
14. *Calycotome villosa* (Vahl.) Link.
15. *Campanula rapunculus* L.
16. *Carlina involucrata*
17. *Centaurea eryngoides*

18. *Centaurea hololeuca*
19. *Centaureum sp.*
20. *Cephalaria keserwanensis*
21. *Cirsium diacantha*
22. *Cistus sp.*
23. *Clematis flammula L.*
24. *Cotoneaster nummularia L.*
25. *Crataegus monogyna*
26. *Crucianella*
27. *Cuscuta planiflora*
28. *Daucus carota*
29. *Delphinium staphisagria*
30. *Dianthus sp.*
31. *Dianthus orientalis brachyodontus*
32. *Echinops villosus*
33. *Eryngium creticum Lam.*
34. *Eryngium falcatum*
35. *Eryngium glomeraum*
36. *Euphorbia sp.*

Annex 4. List of plant species collected during spring 2008. [Cont'd]

37. *Fraxinus ornus L.*
38. *Fumana sp.*
39. *Gallium pestalozzae*
40. *Gallium pruscence*
41. *Hordeum bulbosum*
42. *Jasminum fruticans*
43. *Juniperus oxycedrus L.*
44. *Lactuca*
45. *Lamium truncatum Boiss.*
46. *Laurus nobilis L.*
47. *Lonicera numularifolia*
48. *Lonicera sp.*
49. *Malcolmia chia*
50. *Malus trilobata (Lab.) C.K.Schneider*

51. *Michauxia campanuloides*
52. *Micromeria* sp.
53. *Ononis natrix* L.
54. *Ononis spinosa*
55. *Origanum libanoticum* Boiss.
56. *Origanum syriacum* L.
57. *Ostrya carpinifolia*
58. *Paeonia mascula* (L.) Mill.
59. *Pallenis spinosa*
60. *Phlomis longifolia* Boiss. & Bl.
61. *Pistacia palaestina* Boiss.
62. *Prangos*
63. *Primula vulgaris* Huds.
64. *Prunus ursina* Ky.
65. *Psoralea bituminosa* L.
66. *Pyrus syriaca*
67. *Quercus calliprinos*
68. *Quercus cerris* L. var. *pseudo-cerris* (Boiss.) Boiss.
69. *Quercus infectoria* Oliv.
70. *Reseda*
71. *Rhamnus alaternus*
72. *Rhus coriaria* L.

Annex 4. List of plant species collected during spring 2008. [Cont'd]

73. *Rosa* sp.
74. *Rubia aucheri* Boiss.
75. *Rubus tomentosus*
76. *Ruscus aculeatus* L.
77. *Salvia* sp.
78. *Salvia triloba* L.
79. *Scabiosa*
80. *Scutelaria*
81. *Sideritis*
82. *Silene cucubalis*
83. *Silene* sp.

- 84. *Spartium junceum* L.
- 85. *Stachys distans* Benth.
- 86. *Stryax officinalis* L.
- 87. *Tamus communis*
- 88. *Tanacetum cilicium*
- 89. *Teucrium divaricatum*
- 90. *Thesium humile*
- 91. *Umbilicus* sp.
- 92. *Urginea* sp.
- 93. *Verbascum* sp.
- 94. *Viola odorata*

Annex 5. Descriptor for the biodiversity richness

Date:	Name:
Affiliation:	Address:
Phone:	
Sheet Reference:	

SITE DESCRIPTION

Region	Jabal Moussa
Sub-region:	<input type="checkbox"/> <input type="checkbox"/> Common land <input type="checkbox"/> Private <input type="checkbox"/> Waqf

Land ownership					
Quadrat Nb. & Code :				Altitude (m)	
Longitude	°	,	"	Weather	Sunny
Latitude	°	,	"	GPS Nb.	

Habitat Description

Topography			
<input type="checkbox"/> Valley bottom	<input type="checkbox"/> Mountain peak	<input type="checkbox"/> Bedrocks	<input type="checkbox"/> Hedges
<input type="checkbox"/> Slopes	<input type="checkbox"/> Water courses	<input type="checkbox"/> Cliff rocks	<input type="checkbox"/> Others
Land Use/land cover			
<input type="checkbox"/> Dense forest	<input type="checkbox"/> Open forest	<input type="checkbox"/> Shrubland	<input type="checkbox"/> Abandoned lands
<input type="checkbox"/> Medium veg. cover	<input type="checkbox"/> Low veg. cover	<input type="checkbox"/> Agriculture lands	<input type="checkbox"/> Others
Evidence of disturbances			
<input type="checkbox"/> Mammals	<input type="checkbox"/> Domestic animals	<input type="checkbox"/> Agro-chemical	<input type="checkbox"/> Recreational activities
<input type="checkbox"/> Grazing	<input type="checkbox"/> Ethnobotanical usage	<input type="checkbox"/> Others	

Plant specimens code & Nb	Flower Color	Odor	Common name	Distribution	Notes
				<input type="checkbox"/> Patchy <input type="checkbox"/> Pure stands <input type="checkbox"/> Uniformed/mixed	
Notes					

Surveillance
Observed plant's invasiveness:
Health: Insects and others
Natural heritage/cultural sites (Caves, Gouffre, etc.)