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Results of the 12th “Iter Mediterraneum”  
in Tunisia, 24 March - 4 April, 2014

(Occasional Papers from the Herbarium Greuter – N° 3)

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## The 12th “Iter Mediterraneum” in Tunisia, 24 March – 4 April 2014

### Résumé

Domina, G., Greuter, W., Elyes Kchouk, M., El Mokni, R., Smaoui, A., Vitek, E., Bazan, G., Escobar, P. & Raimondo, F. M.: The 12th “Iter Mediterraneum” in Tunisia, 24 March – 4 April 2014. — *Bocconea* 27(1): 5-11. 2015. — ISSN: 1120-4060 printed, 2280-3882 online.

The organization and logistics of the 12th OPTIMA Iter in Tunisia from 24 March to 4 April 2014 by OPTIMA and ATUTAX is here reported. The material used and the workflow are illustrated as reference for the organization of future similar collaborative botanical excursions.

*Mots-clés:* Itinera mediterranea, OPTIMA, ATUTAX, logistics, scientific mission.

This is an account of the organization and logistics of the 12th OPTIMA Iter in Tunisia from 24 March to 4 April 2014, to serve as baseline for the organization of future similar collaborative botanical excursions.

The general organization followed the indications by Valdés (1991). The main aims of the Itinera Mediterranea are to improve the floristic knowledge of visited countries and to train in the field junior botanists through the expertise of accompanying senior ones. This current Iter was organized one year in advance by ATUTAX (Association Tunisienne de Taxonomie) and OPTIMA. The route was selected by ATUTAX and approved by the OPTIMA Secretariat, taking into account the Important Plant Areas of Tunisia defined by Kchouk & Smaoui (2013). The Iter was divided into three portions, each devoted to the study of a particular area (Fig. 1): Cap Bon (24 to 28 March), Mogods (29 March to 1st April) and Kroumirie (2 to 4 April); and each based at a different hotel. Starting from these logistic bases, a total of 43 collecting sites were visited, belonging to six of the country's phytogeographical regions defined by Cuénod (1954): Cap Bon, Dorsale Tunisienne, Tunisie du Nord-Est, Vallée de la Medjerdah, Mogods, and Kroumirie (see Greuter & Domina 2015: Table 1). Collecting sites were so chosen as to be attainable by bus in 1.5 hours at most, starting from the hotel. For transport, a bus with 22 seats was available. For transfer of equipment and luggage from one hotel to the next, a lorry with 11.5 m<sup>3</sup> charge volume was available. At least one 4×4 vehicle would have been desirable, to shuttle participants from the bus to areas not accessible by paved roads, but costs for this facility were prohibitive, so that participants had to reach such areas by foot.

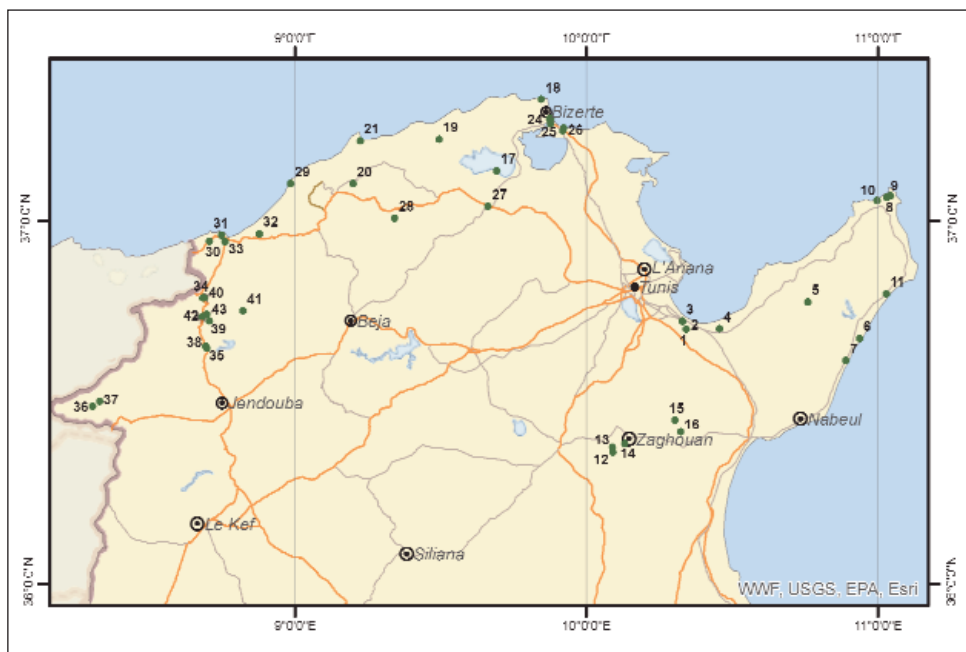


Fig. 1. Map of the sites visited during the XII OPTIMA Iter in Tunisia.

On the first day, an introductory seminar illustrating the geological, climatic, environmental and floristic peculiarities of the visited areas was held: It is here summarised by Smaoui (2015).

Each hotel offered suitably dimensioned facilities for the preparation and drying of the collected material: a large room equipped with tables and electric power, permitting “dirty” work, the storage of newspapers, presses and other supplies as well as the installation of the drying equipment.

Following a public call, applicants were selected for participation on the basis of their submitted curricula. OPTIMA selected 4 junior and 6 senior foreign participants; ATUTAX selected the 14 Tunisian participants: 2 to accompany the whole Iter and 12 who, by groups of 4, were to take turns over the three successive portions. There were thus 24 participants in total, 14 Tunisian and 10 from abroad. At any one time, the group (Fig. 2 and 3) comprised 16 persons.

### *Tunisian participants*

- Ridha El Mokni (24 March to 4 April)
- Abderrazak Smaoui (24 March to 4 April)
- Inès Ellouze (24 to 28 March)
- Henda Merchaoui (24 to 28 March)
- Nesrine Mrabet Rokbeni (24 to 28 March)
- Ameni ben Zineb (24 to 28 March)
- Fathia Abdallah Bouhdima (29 March to 1st April)



Fig. 2. Group photograph at Jebel Ressay, 28 March 2014.



Fig. 3. Group photograph near Tabarka, 2 April 2014.

Imtinène ben Hadj Jilani (29 March to 1st April)

Awatef Rhimi (29 March to 1st April)

Chahed Thouraya (29 March to 1st April)

Lotfi Abdallah (2 to 4 April)

Mohamed Dammak (2 to 4 April)

Imen Lahmayer (2 to 4 April)

Wala Toumi (2 to 4 April)

### *Foreign participants*

(24 March to 4 April, unless otherwise stated; *s*, senior participant; *j*, junior participant)

Nicola Ardenghi, Pavia, *j*.

Giuseppe Bazan, Palermo, *s*.

Gianniantonio Domina, Palermo, *s*.

Pedro Escobar, Vienna, *s*.

Werner Greuter, Palermo (24 March to 2nd April), *s*.

Anna Guttová, Bratislava, *j*.

Francisco Javier Jiménez López, Sevilla, *j*.

Francesco Maria Raimondo, Palermo (29 March to 4 April), *s*.

Marek Slovak, Bratislava, *j*.

Ernst Vitek, Wien, *s*.

In the field, participants formed collecting teams of 2(-3), each team concentrating on, but not limited to, specific groups of families assigned to its care. For vascular plants, 10 sets of each gathering were collected when feasible. Lichens were the exclusive domain of Anna Guttová (see Guttová 2014 and Guttová & al. 2015). Bryophytes were taken care of by Gianniantonio Domina and Francesco M. Raimondo (see Campisi & al. 2015).

In the late afternoon, back at the hotel, the collected specimens were pressed between newspaper and, in the process, numbered and provisionally identified. All specimen and locality data, including such additional data as flower colour or estimated size, were entered on the spot into an MS-Excel table, all this information is to be used subsequently for the purpose of labelling. The definitive, univocal gathering numbers, sequentially assigned, were noted in a standard location on the newspaper wrappers. Between the numbered, permanent wrappers enfolding the plants, newspaper pads were inserted to serve as blotting paper.

On the following day, the first-day newspaper pads were replaced by corrugated cardboard (one per 1-3 plant wrappers) and the drying process was accelerated by the use of electric heating, following a technique learnt in 2003 during the excursion “Epifenómeno” organized by Santiago Castroviejo and the Working Group of Flora Iberica in Sardinia.

The presses, with multilayer wood boards of 30 × 40 cm, were ca. 80 cm high, containing ca. 80 cardboard sheets. Each was connected to an electric ventilated heater by a sheath of fireproof tarpaulin (100 × 250 cm), tightly fixed on either side by means of elastic rope, the cardboard corrugations lying in the direction of the hot air flow (Fig. 4 and 5). The heaters were set to medium power (1000 W), to avoid overheating that might have prejudiced future DNA extraction. With temperature of ca. 45°C within the presses, most of the plants were dry within a single day.





Fig. 4 and 5. The presses for drying specimens.

In total, 22 presses and 4 electric heating devices were available for simultaneous use during the Iter, and 2000 Kg (about 5 m<sup>3</sup>) of newspaper were purchased. Due to prevailing bad weather, drying damp paper out of doors was possible only for two days.

As agreed in advance, local authorities were notified daily of the group’s planned movements so as to grant free access to protected or otherwise restricted areas and ensure local support. Lunches were organized in the field; dinners were taken at the hotels. As Escobar (2014) reports, we enjoyed a jolly and companionable atmosphere that made the Iter a pleasant, instructive, memorable and event.

At the end of the excursion, most specimens were dry but some were still in the presses, for which our Tunisian hosts undertook to complete the drying. This was important because the transfer of the harvest to Palermo took much longer than expected: due to logistic problems and customs formalities, the collected material remained in Tunisia for another month, eventually to be shipped to the Botanical Garden and Herbarium Mediterraneum in Palermo in two pallets by private transport. Here the material was sterilized by freezing, the critically identified, mostly by W. Greuter (see Greuter & Domina 2015). Formatting and printing the labels was done on the tabular data prepared by care of E. Vitek.

The principal sets of herbarium specimens, sorted, packed and dispatched by care of the Herbarium Mediterraneum, were distributed in conformity with a previous agreement among the participants. They are as follows:

1. Palermo (OPTIMA Herbarium, PAL-Gr):.....1386 Nos.
2. Tunisi (Centre de Biotechnologie de Borj Cedria): .....1278 Nos.
3. Vienna (W): .....1169 Nos.
4. Seville (SEV).....1053 Nos.
5. Bratislava (SAV).....939 Nos.
6. Pavia (PAV) .....851 Nos.

The images of the set in Palermo can be viewed in the Herbarium Mediterraneum Virtual Herbarium ([http://147.163.105.223/herbarium\\_vsimple\\_en.asp#](http://147.163.105.223/herbarium_vsimple_en.asp#)). Depending on progress with mounting, the set in Vienna will be made available in Virtual Herbaria (<http://herbarium.univie.ac.at/database/search.php>) within the next year.

### Acknowledgements

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Abderrazak Smaoui

## **Bioclimat et Végétation de la Tunisie et des régions prospectées pendant le 12ème ITER Mediterraneum de OPTIMA**

### **Résumé**

Smaoui, A.: Bioclimat et Végétation de la Tunisie et des régions prospectées pendant le 12ème ITER Mediterraneum de OPTIMA. — Bocconea 27(1): 13-20. 2015. — ISSN: 1120-4060 printed, 2280-3882 online.

Ici sont présentés les principales caractéristiques physiques, bioclimatiques et la végétation de la Tunisie et, en particulier, des régions du Cap Bon, Les Mogods et la Kroumirie, situé dans le nord du pays, explorées au cours de le 12ème Iter Mediterraneum de l'OPTIMA tenue du 24 Mars à 5 Avril ici 2014.

*Mots-clés:* Bioclimatologie, végétation tunisienne, Afrique du Nord, OPTIMA.

### **Introduction**

La Tunisie se situe au Nord de l'Afrique, est bordée à l'Ouest par l'Algérie et au sud-Est par la Libye. Elle établit au Sud la jonction entre les Sahara algérien et libyen. La Tunisie est le plus petit pays de l'Afrique du Nord. Les côtes tunisiennes sur la Méditerranée s'étendent au Nord et à l'Est sur 1300 kilomètres.

Son relief souligne le passage entre le domaine sud européen et les espaces africains. Elle se trouve à cheval entre le domaine Atlasique, partie méridionale du vaste plissement tertiaire qui structure une partie du Sud Européen, et le vieux continent africain.

### **Le relief**

La géographie de la Tunisie est marquée par l'extension du massif montagneux de l'Atlas qui prend source au Sud du Maroc et se subdivise en deux grands alignements orientés Ouest-Est: l'Atlas Tellien qui suit le littoral méditerranéen et l'Atlas Saharien qui s'estompe en arrivant au Cap Bon et au Golfe de Hammamet (Fig. 1). La partie Nord de l'Atlas Tellien se présente sous forme de 3 alignements de moins en moins élevés en arrivant au littoral oriental et qui sont: les Monts de Kroumirie, les Monts Nefza et les Mogods. Au Sud de ces Monts, la vallée de la Medjerda est alimentée par plusieurs



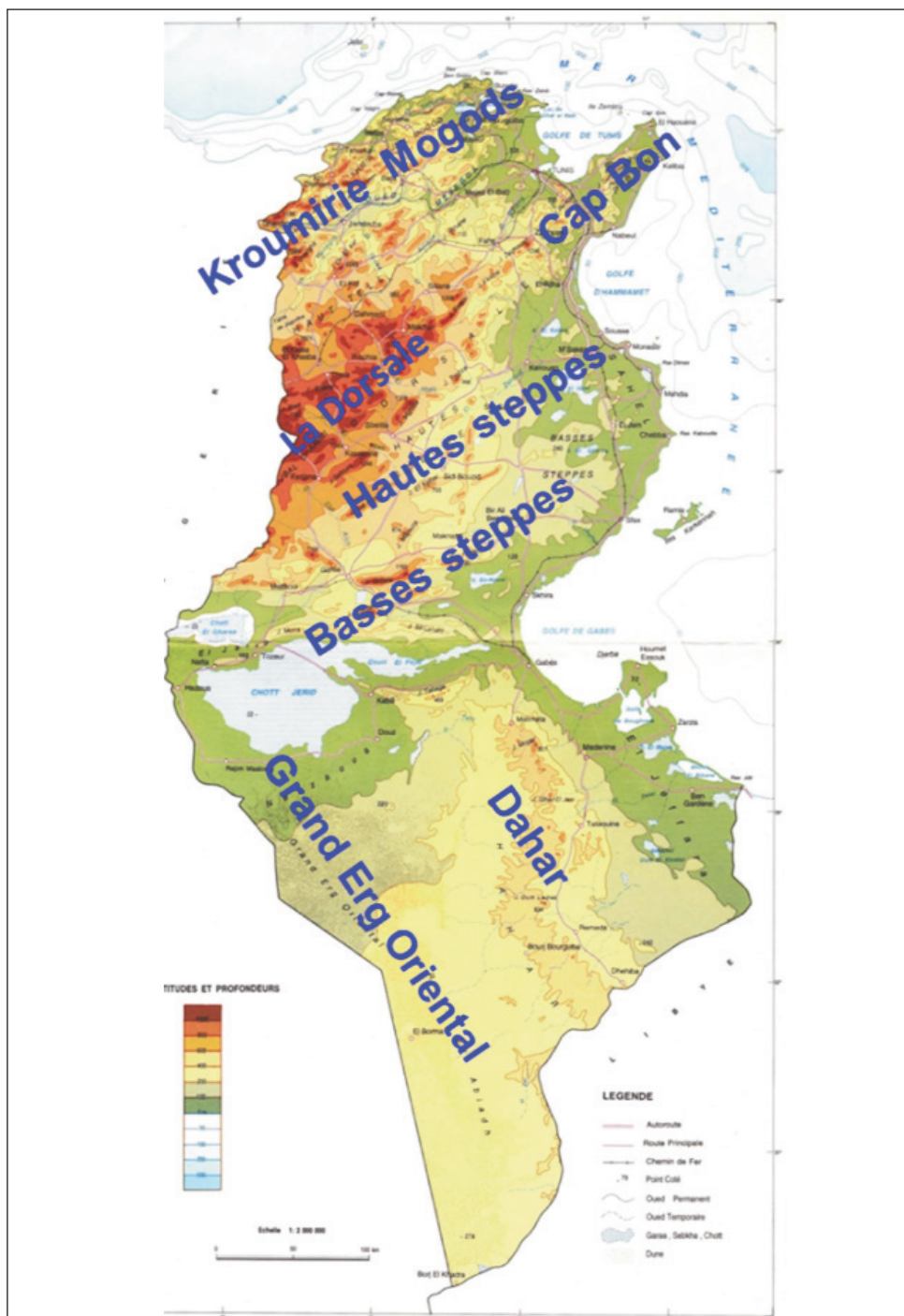


Fig.1. Carte géographique de la Tunisie, montrant les principaux reliefs du pays.

oueds, puis succède la zone collinaire des Monts de Téboursouk entre la ville du Kef et le Golfe de Tunis: c'est le Haut Tell.

Plus au Sud, la Dorsale Tunisienne s'étale d'Ouest en Est, de la frontière algérienne jusqu'au Cap Bon, sur le littoral Est. Elle se compose de chaînons montagneux qui alternent avec des plateaux escarpés et des dépressions. Au Sud de la Dorsale, l'Atlas Saharien se réduit à quelques unités montagneuses disséminées dans la région des hautes steppes qui sont sillonnées d'Ouest en Est par quelques monts isolés. Au Sud de Gafsa les dépressions des grands Chotts marquent le début du Sahara. Au Sud des Chotts et jusqu'au Dhahar s'étale le Grand Erg Oriental. Les monts du Dhahar, les plaines de la Jeffara et d'El Ouaâra terminent le paysage de la Tunisie du Sud au bord de la méditerranée orientale avec l'île de Djerba.

### ***Bioclimat***

Selon le quotient d'Emberger (1960), il existe cinq zones bioclimatiques, allant du Saharien à l'humide supérieur (Fig. 2). La pluviométrie et les températures, hivernales et estivales, sont les facteurs bioclimatiques déterminant de ce découpage. Ces facteurs dépendent de l'altitude et de la situation plus ou moins continentale. Les zones à l'intérieur des terres ont des étés plus chauds et des hivers plus froids que celles qui bénéficient des effets adoucissants de la mer.

Le bioclimat est caractérisé par trois facteurs:

- les précipitations annuelles (P)
- moyenne de température la plus élevée du mois le plus chaud (Juillet) (M)
- moyenne de température la plus basse du mois le plus froid (Janvier) (m)

Quotient pluviotermique d'Emberger Q

$$Q = (P \times 2000) / (M^2 - m^2)$$

P= moyenne de la pluviométrie annuelle

M= température moyenne du mois le plus chaud (degré Kelvin)

m= moyenne de la température du mois le plus froid (degré Kelvin)

Tableau 1. Quelques valeurs de l'indice d'Emberger.

<b>Etage bioclimatique</b>	<b>Quotient d'Emberger</b>	<b>localisation</b>
Humide	110 -150	Extrême Nord
Sub-Humide	70 -110	Nord
Semi-Aride	70 - 45	Nord
Aride	45 -10	Centre et Sud
Saharian	< 10	Extrême Sud

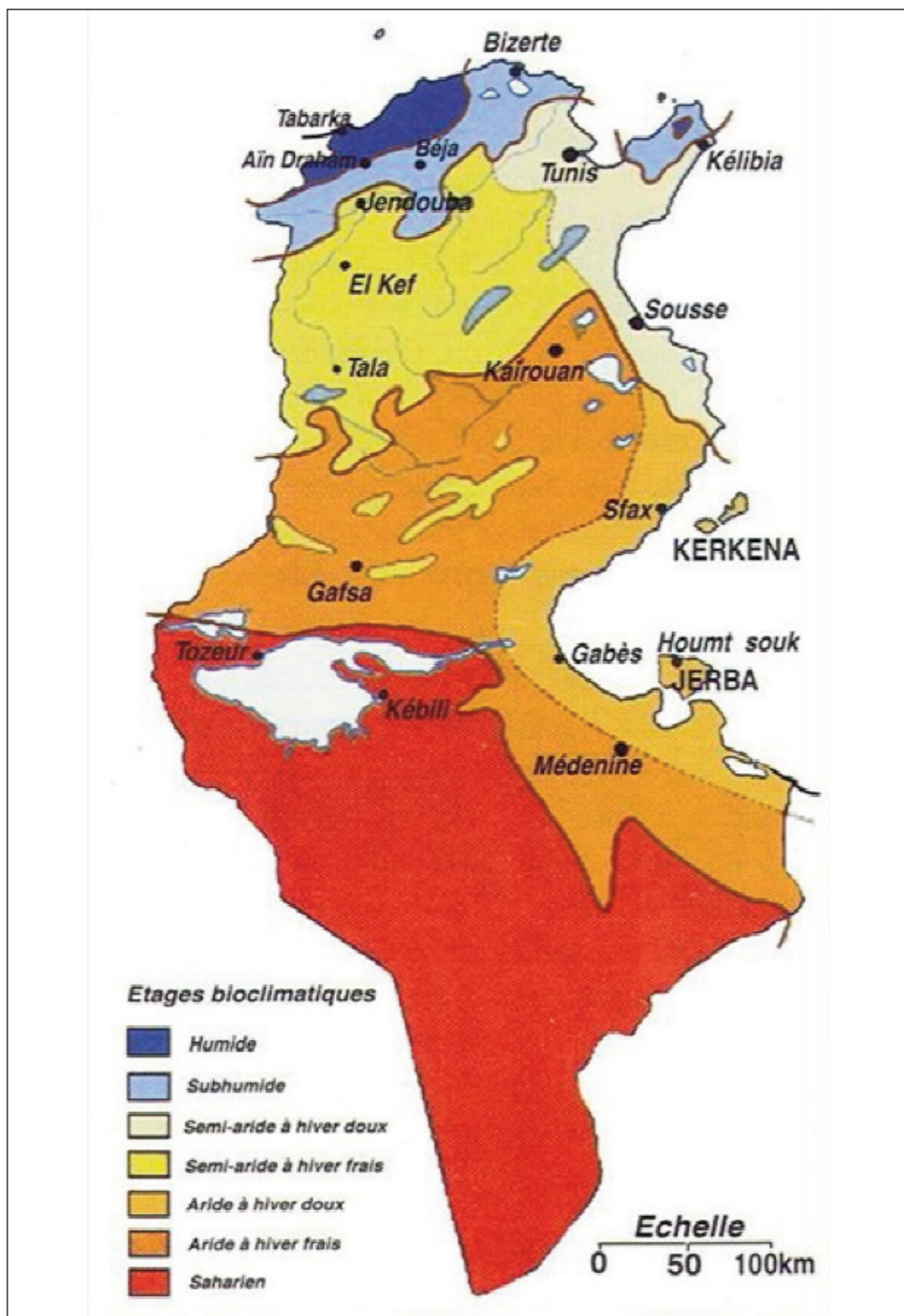


Fig.2. Carte bioclimatique de la Tunisie.



### Les associations végétales forestières

Elles sont en rapport avec les transitions latitudinales et altitudinales.

- La forêt est une formation ligneuse dont la hauteur des arbres dépasse 7 m et leur densité 100 pieds/ha.
- Matorral : C'est une formation forestière dégradée, dont la hauteur des arbres quand ils existent est inférieure à 7 m.
- Maquis : C'est un matorral haut et dense, lié à un substrat siliceux et à une tranche pluviométrique annuelle moyenne de 600 mm.
- Garrigue : C'est un matorral moyen, ouvert, lié à un substrat calcaire

Les formations forestières occupent 830 737 ha dont:

- 60,5% de forêts,
- 16% de maquis et garrigues arborés, et
- 24% de maquis et garrigues non arborés.

### La végétation tunisienne

Elle peut être classée en trois grands domaines (Fig. 3):

- la végétation tellienne
- la végétation steppique
- la végétation subdésertique et désertique

#### I- la végétation tellienne

– *la végétation méditerranéenne subhumide:*

Elle occupe les montagnes de la Kroumirie. Cette région reçoit des quantités de précipitations supérieures à 800 mm/an par an et plus de 1000 mm/an sur les hauts versants exposés au Nord et Nord-Ouest (Fig. 4). Les hivers sont frais et pluvieux.

Le sol est siliceux (grès de Numidie). Les formations climaciques sont le chêne liège aux feuilles persistantes surtout sur les sommets. Le chêne zen aux feuilles caduques surtout sur les versants moins ensoleillés. Le pin maritime est localisé près de Tabarka. Le sous-bois est assez dense et formé par la bruyère, la fougère, les cystes. Sur les Mogods et les jbelles du Cap Bon occidental, les altitudes sont faibles. Les précipitations sont de 600 à 800 mm/an et le sol est siliceux. La forêt laisse la place aux maquis de ciste, arbousier, genêt, avec des îlots de chênes kermès (espèce climacique des dunes littorales) et de chêne liège

– *La végétation méditerranéenne:*

Elle se développe sur les autres jbelles du Tell septentrional, en direction de l'intérieur des terres. Les sols calcaires et marneux et la pluviométrie est entre 600 et 800 mm/an. C'est la région de Amdoun, Béjaoua, Hédhils, Mateur, Cap Bon. La formation climacique est l'oléo-lentisque (olivier sauvage associé aux lentisques), le caroubier et le palmier nain. Dans le Tell oriental, sur les jbelles humides et soumis aux influences maritimes (jbelles Zagouan et Jbel Ressas) subsiste une forêt claire de thuya de Berbérie.

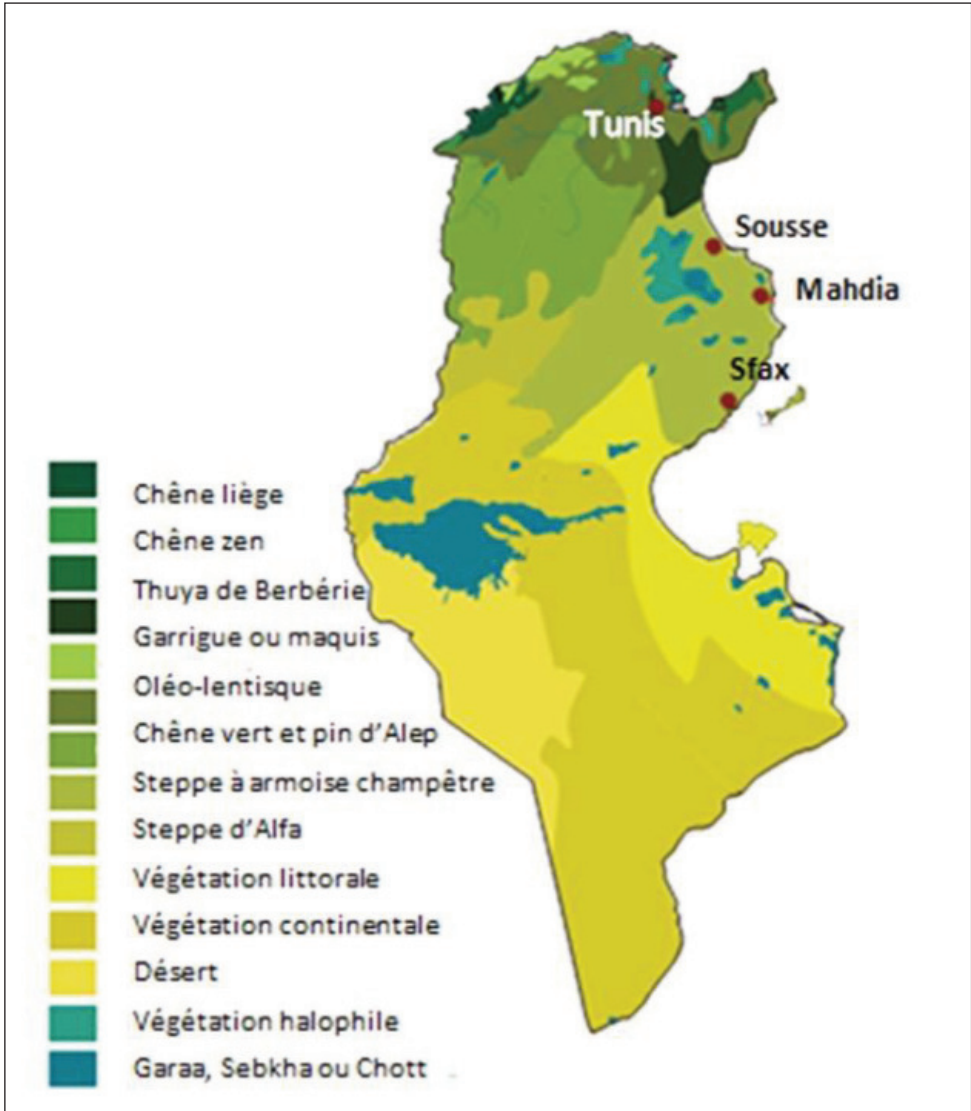


Fig.3. Carte des formations végétales naturelles de la Tunisie.

– *La végétation méditerranéenne semi-aride:*

C'est le domaine du Haut Telle et Tell Oriental. La pluviométrie comporte entre 400 et 600 mm/an. Dans le Haut Tell, la végétation est de type continental. Sur les plus hauts sommets (Chaâmbi, Kesra, Serj, Semmama) le chêne vert forme un peuplement pur. Au dessous de 1000 m, le chêne vert se mélange avec le pin d'Alep. Le pin d'alep est une espèce xérophile et plastique. Il s'adapte aux sols calcaires. Le chêne vert est moins résistant aux chaleurs et à la sécheresse.

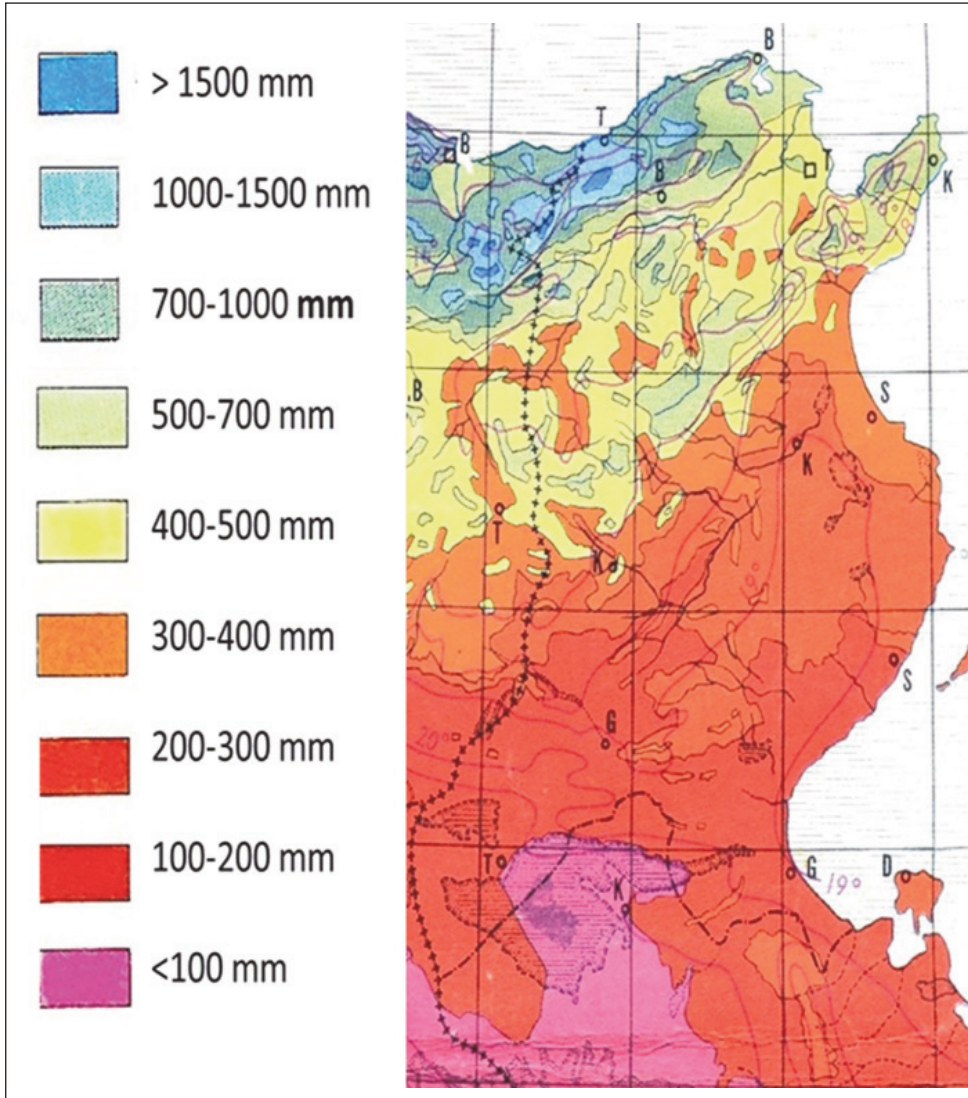


Fig.4. Carte des pluviométries annuelles de la Tunisie.

## II- la végétation steppique

Dans la Tunisie centrale, c'est le domaine de la steppe aride aux formations xérophiles adaptées aux faibles précipitations (entre 150 et 400 mm/an), aux fortes amplitudes thermiques, à l'intense évaporation, et à la fréquence des vents secs. Elle varie de l'ouest à l'est. Dans les sommets des Hautes steppes persiste encore une forêt claire et dégradée de Pin d'Alep. Plus bas apparaît le genévrier de Phénicie, le résineux le plus adapté à la sécheresse



Fig.5. Carte du Nord de la Tunisie indiquant les 3 régions prospectées lors de la 12<sup>ème</sup> Iter de OPTIMA, en 2014. Région 1: Cap Bon, 2: Mogods, 3: Kroumirie.

et la continentalité. Le sous-bois est formé par le romarin et l'alfa. Dans les basses steppes, l'armoise champêtre couvre les sols sablonneux. Autour des dépressions et les fonds d'oueds au sol argileux se développent le jujubier et les plantes halophiles (*Atriplex* et *Salsola*).

### III- la végétation subdésertique et désertique

Elle correspond aux régions de bordure du Sahara. Les précipitations sont de 100 à 200 mm/an par an.

La végétation est formée par les pocées très clairsemées. Dans les zones subdésertiques littorales, la végétation est formée de *Rhanterium* qui occupe de vastes espaces jusqu'en Libye. Sur le Dhar apparaissent le *Haloxylon* et *Aristida*. Dans le Erg oriental on trouve le *Calligonum* qui peut atteindre 5 m de haut.

### Régions de la prospection de la 12<sup>ème</sup> Iter-OPTIMA

La douzième session des Itinear Mediterranea de l'OPTIMA a été organisée en Tunisie du Nord entre le 23 mars et le 05 avril 2014.

Trois grandes régions ont été prospectées (Fig. 5): Le Cap Bon; Les Mogods; La Kroumirie.

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Werner Greuter & Gianniantonio Domina

## Checklist of the vascular plants collected during the 12th “Iter Mediterraneum” in Tunisia, 24 March – 4 April 2014

### Abstract

Greuter, W. & Domina, G.: Checklist of the vascular plants collected during the 12th “Iter Mediterraneum” in Tunisia, 24 March – 4 April 2014. — *Bocconeae* 27(1): 21-61. 2015. — ISSN: 1120-4060 printed, 2280-3882 online.

The vascular plants (plus one alga) collected during Iter Mediterraneum XII of OPTIMA in North Tunisia have been studied. In all, 1374 gatherings were made from 43 localities in the “Cap Bon” region, “Dorsale Tunisienne”, “Tunisie du Nord-Est”, “Vallée de la Medjedah”, “Mogods” and “Kroumirie” areas. They belong to 82 families and 539 species or subspecies. Three taxa are new for the flora of Tunisia (*Cerastium diffusum* subsp. *gussonei*, *Senecio leucanthemifolius* subsp. *mauritanicus*, and *Ulmus minor* subsp. *canescens*), 7 represent new records for the “Kroumirie”, 15 for the “Mogods”, 3 for the “Tunisie du Nord-Est”, 2 for the “Dorsale Tunisienne”, and 8 for “Cap Bon”.

*Key words*: Flora of Tunisia, Kroumiria, Cape Bon, Itinera Mediterranea, OPTIMA, vascular plants.

### Collecting localities

A list of collecting localities, drawn up immediately and daily updated as the excursion progressed, was used as basis for labelling. The locality data were checked and confirmed, as to accuracy of place names and consistency of spelling, by our Tunisian hosts, in particular Ridha El Mokni. The coordinates were ascertained on the spot by means of the global positioning system (GPS) Garmin GPS map CX60. When the collecting area was sizeable, the position of the extreme points visited was measured and translated into ranges of latitude and longitude, as recorded on the labels; however, in order to make it possible to georeference the specimens unambiguously, the ranges were reduced to the average values for databasing purposes, and the values reported below are these average values.

The localities, mapped in Fig. 1, have been numbered chronologically as visited by us. In addition, each locality was plotted on the map of phytogeographical regions defined by Cuénod (1954), also used by Pottier-Alapetitie (1979, 1981). Six of these regions, as shown in Fig. 1, were visited by us: **CB** (“Cap Bon”), **DT** (“Dorsale Tunisienne”), **K** (“Kroumirie”), **M** (“Mogods”), **NE** (“Tunisie du Nord-Est”), and **VM** (“Vallée de la Medjedah”). In the locality list (Table 1), these abbreviations are prefixed to the locality



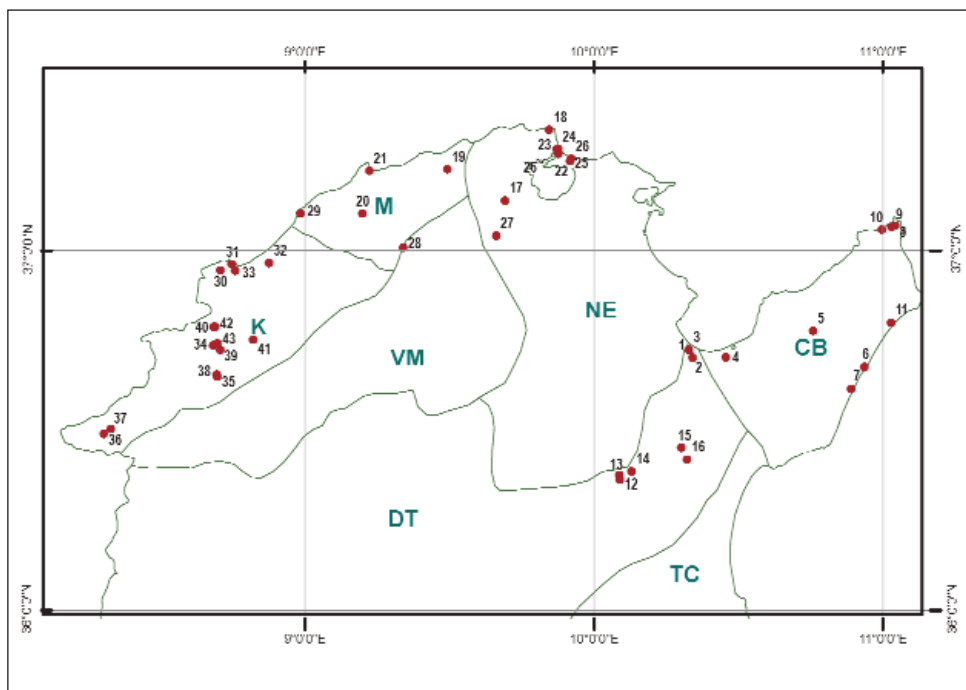


Fig. 1. The visited localities in the phytogeographical regions defined by Cuénod (1954).

numbers. In the species enumeration, the same abbreviations are given in the first place, so as to convey a quick, general impression of the distribution pattern of each taxon that emerges from the collected material.

Habitat indications for each locality have been generalised, but the particular habitat of individual species was also noted and is rendered below by means of lower-case Latin letters added to the locality number.

### Enumeration of the collected material

Within each of the principal groups (algae, pteridophytes, gymnosperms, dicotyledons, monocotyledons) the arrangement is alphabetical by families, then genera, then species. The delimitation of families follows NCU-3 (Greuter & al. 1993), the nomenclature of species and subspecies follows Med-Checklist (Greuter & al. 1984, 1986, 1989; Greuter 2008), as updated, when appropriate, to conform with Euro+Med Plantbase (Euro+Med 2006-) and/or the N African *Index synonymique* of Dobignard & Chatelain (2010-2013) and/or the Catalogue of Life dynamic checklist (Roskov & al. 2015), or any other relevant publications cited specifically. Infra-subspecific taxa are not recognised.

The name of the taxon is followed, on the same line, by the natural territorial units defined by Cuénod (**CB, DT, K, M, NE, VM**: see above and Fig. 1). On a new line, the

Table 1. A list of the collecting localities of *Iter Mediterraneum* XII to Tunisia, 2014

N°	Gouvernement	Locality	alt. (m)	lat. N	long. E	Habitat	Date	coll. N°s
DT-1	Ben Arous	Massif of Bou Kornine, c. 3-4 km SSE of Hammam-Lif	120-300	36°42'15"	10°20'31"	Maquis and garrigue with <i>Tetraclinis</i> , and ruderal places around parking; <b>1b</b> , Ruderal	24/03/2014	1-75
DT-2	Ben Arous	Massif of Bou Kornine, c. 0.8 km SSW of Hammam-Lif, at the parking area of the Ecomusée	110	36°43'34"	10°19'47"	Ruderal roadside	24/03/2014	76-88
DT-3	Ben Arous	Massif of Bou Kornine, c. 0.8 km SSW of Hammam-Lif, along the road below the parking area of the Ecomusée	90	36°43'35"	10°19'44"	Garrigue	24/03/2014	89-96
CB-4	Nabeul	C. 3 km WNW Soliman, along the road to Ejjeimi beach	1	36°42'20"	10°27'24"	Salt marsh; <b>4b</b> , In water	24/03/2014	97-133
CB-5	Nabeul	Massif of Jebel Sidi Abderrahmane, c. 9 km NW Al Middah, NW of small village	200-280	36°46'45"	10°45'31"	Garrigue, grazed meadows and rocks; <b>5b</b> , Ruderal	25/03/2014	134-213, 262-263
CB-6	Nabeul	Littoral belt of Qurba, c. 13 km NNE of Qurba, 2.8 km SSW of Lebna	0-5	36°40'45"	10°56'11"	Dunes; <b>6b</b> , Inner dunes; <b>6c</b> , Ruderal; <b>6d</b> , Sand dunes and ruderal salt marshes; <b>6e</b> , Wetland	25/03/2014	214-260
CB-7	Nabeul	Littoral belt of Qurba, c. 5 km NNE of Qurba, shore of lagoon	0-2	36°37'5"	10°53'24"	Ruderal and salt marshes; <b>7b</b> , Ruderal	25/03/2014	264-284
CB-8	Nabeul	Around top of Cape Bon	350-400	37°04'12"	11°02'33"	Garrigue, wind blown meadows and rocks; <b>8b</b> , Foot of rocks; <b>8c</b> , Rock ledges; <b>8d</b> , Rockface; <b>8e</b> , Rocks	26/03/2014	285-333
CB-9	Nabeul	Road to Cape Bon c. 2.3 km NE of El Haouaria	180	37°03'55"	11°01'47"	Forest and maquis	26/03/2014	334
CB-10	Nabeul	C. 1.6 km NW of El Haouaria, coast near the Phoenician-Roman caves	5-70	37°03'28"	10°59'46"	Rocky cliffs, sand dunes and <i>Pinus</i> forest on sand; <b>10b</b> , Dunes	26/03/2014	335-360
CB-11	Nabeul	Road from Kelibia to Manzil Tamim, c. 4.6 km NE Manzil Tamim, S of bridge across a small river	5-15	36°48'6"	11°01'40"	Ruderal; <b>11b</b> , Dry pasture; <b>11c</b> , Dry slope; <b>11d</b> , Maquis; <b>11e</b> , River bank; <b>11f</b> , Riverside; <b>11g</b> , Roadside, ruderal, segetal and besides river; <b>11h</b> , Ruderal in shade; <b>11i</b> , Sandstone rocks; <b>11j</b> , Segetal; <b>11k</b> , Shady places	26/03/2014	361-429
DT-12	Zaghoun	Massif of Jebel Zaghoun, road to Jebel Zaghoun from the NW side	500-630	36°21'53"	10°05'25"	Maquis, rocks and roadside; <b>12b</b> , Rocks	27/03/2014	430-497

DT-13	Zaghoun	Massif of Jebel Zaghoun, road to Jebel Zaghoun from the NW side	300-310	36°22'43" 10°05'18"	Maquis, rocks, roadside; <b>13b</b> , Ruderal	27/03/2014	498-505
DT-14	Zaghoun	Zaghoun, near the Roman fountain	275	36°23'19" 10°07'50"	Rock	27/03/2014	506-507
DT-15	Zaghoun	4 km N of Oued Ezzit, S side of the mountain	195-210	36°27'13" 10°18'11"	Grazed meadow and maquis/forest	27/03/2014	508-550
DT-16	Ben Arous	Jebel Ressas, c. 3.5 km SW of Dawwar at Talib 'Ali	80-200	36°36'24" 10°19'20"	Maquis and garigue with rocks and gravel field; <b>16b</b> , Rock	28/03/2014	551-634
NE-17	Bizerte	Jebel Ichkeul, S of Lake Ichkeul, c. 8 km W of Menzel Bourgiba, peninsula N and hill W of the mineral well	0-100	37°08'20" 09°41'32"	Maquis with rocks and grazed meadows; <b>17b</b> , Brackish lake, submerged; <b>17c</b> , Lake shore (brackish); <b>17d</b> , Rock base; <b>17e</b> , Rocks; <b>17f</b> , Ruderal	29/03/2014	635-755
NE-18	Bizerte	Coast c. 6.5 km NNW Bizerte, near the Roman grottos	0-60	37°19'59" 09°50'43"	Dune; <b>18b</b> , Dunes and rocks; <b>18c</b> , Grassland on clay; <b>18d</b> , Rock; <b>18e</b> , Sand; <b>18f</b> , Wet clayey slope	29/03/2014	756-806
M-19	Bizerte	Area NW of Lake Ichkeul, along the road c. 5.6 km WNW of Teskraia	100-240	37°13'29" 09°29'38"	Burned (one year ago) forest and garigue with meadows between; <b>19b</b> , Moist depressions; <b>19c</b> , Rivulet; <b>19d</b> , Roadside ditch	30/03/2014	807-875
M-20	Bizerte	c. 14 km S Cap Serrat, plain between Tamra and Dawwar Mrat	125-130	37°06'12" 09°11'56"	Meadows, humid and segetal places; <b>20b</b> , Roadside ditch	30/03/2014	876-913, 946
M-21	Bizerte	Cap Serrat, E slope and around houses on the beach	0-50	37°13'13" 09°13'24"	Garigue, rocks and ruderal places at beach; <b>21b</b> , Maritime sand; <b>21c</b> , Ruderal; <b>21d</b> , Seaside wetland; <b>21e</b> , Wet places at foot of rock	30/03/2014	914-945
NE-22	Bizerte	City of Bizerta, walls of the Medina	8	37°16'43" 09°52'29"	Wall	31/03/2014	947
NE-23	Bizerte	City of Bizerta, in the Spanish fort	30	37°16'49" 09°52'19"	Semiruderal meadow	31/03/2014	948-949
NE-24	Bizerte	City of Bizerta, promenade by the beach hotels	10	37°16'51" 09°52'38"	Meadow under planted palms	31/03/2014	950
NE-25	Bizerte	C. 5 km SW of Bizerta, N Habib Arifa, along the road in parallel to the highway	20-25	37°14'53" 09°55'03"	<i>Pinus</i> forest on sand dunes	31/03/2014	951-1001
NE-26	Bizerte	C. 5 km SW of Bizerta, sandy coast N of Habib Arifa	0-5	37°15'16" 09°55'20"	Dune; <b>26b</b> , Behind the dunes; <b>26c</b> , <i>Pinus</i> pinea wood behind the dunes; <b>26d</b> , Sand dunes and ruderal	31/03/2014	1002-1014,
NE-26 <sup>bis</sup>	Bizerte	Bizerta, by the drawbridge	5	37°16'00" 09°52'36"	Roadside	31/03/2014	1015-1016
NE-27	Bizerte	Mateur, park in the city	20	37°02'30" 09°39'42"	Weed	01/04/2014	1017-1018



<b>VM-28</b>	Bizerte	S of the road Mateur-Tabarca, 2-3.5 km SW of Sidi Abdallah Ben Saiden	235-450	37°01'13" 09°19'32"	Garigue, rocky slope, semi-ruderal besides track; <b>28b</b> , Along brook; <b>28c</b> , Cultivated as hedge; <b>28d</b> , Field margin; <b>28e</b> , Rocks; <b>28f</b> , Segetal	01/04/2014	1019-1088
<b>M-29</b>	Jendouba	Coast c. 26 km NE of Tabarca, Cap Negro	0-30	37°06'13" 08°59'4"	Maquis and garigue; <b>29b</b> , Littoral rocks; <b>29c</b> , Maquis; <b>29d</b> , Ruderal; <b>29e</b> , Sandy coastal flats	01/04/2014	1089-1122
<b>K-30</b>	Jendouba	Along the road to the Algerian frontier, 4 km WSW Tabarca, above Malloula	170-185	36°56'45" 08°42'26"	<i>Pinus</i> plantation; <b>30b</b> , On sand	02/04/2014	1123-1138
<b>K-31</b>	Jendouba	Tabarca, rocky coast in the N part of the city	0-50	36°57'47" 08°44'51"	Cliffs at coast; <b>31b</b> , Locally escaped from cultivation; <b>31c</b> , Straggling through shrubs; <b>31d</b> , Submersed marine	02/04/2014	1139-1163
<b>K-32</b>	Jendouba	Tabarca, along the road to Tabarca Airport	25-30	36°57'58" 08°52'37"	Sand dunes distant from sea and pond; <b>32b</b> , Aquatic; <b>32c</b> , In water; <b>32d</b> , Sandy soil	02/04/2014	1164-1194, 1199, 1229
<b>K-33</b>	Jendouba	S part of the city of Tabarca	5	36°56'42" 08°45'32"	Ruderal	02/04/2014	1195
<b>K-34</b>	Jendouba	1 km N of Ain Draham	770-780	36°47'24" 08°41'3"	<i>Quercus</i> forest; <b>34b</b> , High above the ground on <i>Quercus</i> suber trunks and branches; <b>34c</b> , On rocks and soil; <b>34d</b> , Roadside ditch; <b>34e</b> , Rocks	02/04/2014	1196-1228
<b>K-35</b>	Jendouba	13.5 km S of Ain Draham, in Al Firnanah	270	36°39'06" 08°41'53"	<i>Quercus</i> forest and rocks	03/04/2014	1230
<b>K-36</b>	Jendouba	El Feidja National Park, between the Park Centre and the watch tower, on rocks	710-770	36°29'34" 08°18'19"	<i>Quercus</i> forest and rocks	03/04/2014	1231-1271
<b>K-37</b>	Jendouba	El Feidja National Park, track to a small forest house ENE of the Park Centre	850-865	36°30'25" 08°19'47"	<i>Quercus</i> forest and maquis	03/04/2014	1272-1292
<b>K-38</b>	Jendouba	13.5 km S of Ain Draham, in Al Firnanah	285	36°39'27" 08°41'41"	Ruderal	03/04/2014	1293-1310
<b>K-39</b>	Jendouba	4.5 km S of Ain Draham, roadside	680-700	36°44'20" 08°40'57"	Humid <i>Quercus</i> forest	03/04/2014	1311-1332
<b>K-40</b>	Jendouba	N end of Ain Draham	730	36°47'23" 08°41'22"	Humid <i>Quercus</i> forest	03/04/2014	1333
<b>K-41</b>	Jendouba	2.8 km S of Ain Draham, c. 1 km NE of the sport training centre	660-670	36°45'16" 08°49'17"	Bog with <i>Sphagnum</i> and surrounding <i>Quercus</i> forest; <b>41b</b> , Along rivulet; <b>41c</b> , Rocks	04/04/2014	1334-1346
<b>K-42</b>	Jendouba	4 km S of Ain Draham, 1.2-1.6 km E of the sport training centre	600-670	36°44'42" 08°41'51"	<i>Quercus</i> forest; <b>42b</b> , Rocks	04/04/2014	1347-1361
<b>K-43</b>	Jendouba	C. 6 km S of Ain Draham, 3 km WSW of Beni m Tir, river valley below the road and track to a small pond above the road	580-615	36°43'36" 08°42'25"	<i>Quercus</i> forest, pond and rivulet; <b>43b</b> , In the water	04/04/2014	1362-1374

individual specimens are enumerated in the format **N: XXXX [Y]**, where **N** stands for the locality number (**1** to **53**, as detailed above), **XXXX** for the specimen number (*1* to *1374*), and **Y** for the number of duplicates collected, which can vary from 0 to 22. This may be followed in parentheses by the qualification “sterile”, “buds”, “fruit remains”, when no fully developed fertile plants were collected; and sometimes “fruits”, when no flowering individuals were found.

Many features concerning the individual gatherings (life form, overall size, and colour, in particular) were noted when the plants were being pressed, and these notes appear on the labels. As reporting these texts for individual gatherings would be largely repetitive, they have been synthesised into short statements given for the taxon as a whole. Other comments, if and when appropriate, are added in the form of Notes.

The senior author (WG) is responsible for plant identification and takes the blame for any errors, except for *Festuca* and *Poa*, named by Nicola Ardenghi, Pavia; *Limonium*, *Orobanche* and *Romulea*, revised by Gianniantonio Domina; *Myoporum* and *Salvia microphylla*, named by Francesco Maria Raimondo; and *Isoetes*, studied by Angelo Troia, Palermo.

The information on new reports for Tunisia were obtained by comparison with Cuénod (1954), Pottier-Alapetite (1979-1981), Greuter & al. (1984, 1986, 1989), Greuter (2008), Le Floc’h & al. (2010), Dobignard & Chatelain (2010-2013), and Euro+Med (2006-); while first records for individual phytogeographical areas were checked against the aforementioned relevant literature and take into account the following floristic and taxonomic papers: Nabli (1989), El Hamrouni (2001), Ghrabi-Gammar & al. (2009), Ferchichi-Ben Jamaa & al. (2010), Domina & Jaouadi (2013), Biondi & al. (2013, 2014), El Mokni & al. (2015), and Martin & al. (2015).

## ALGAE

### *Characeae*

*Chara* sp. – **NE** – submerged

**17b** – 0695 – [10]

## PTERIDOPHYTA

### *Equisetaceae*

*Equisetum telmateia* Ehrh. – **K** – perennial.

**32**: 1191 [7] (sterile).

### *Isoetaceae*

*Isoetes duriyai* Bory – **K** – perennial.

**43**: 1365 [4].

*Isoetes histrix* Bory – **CB, K, M** – tufted perennial.

**8**: 0301 [12]; **19b**: 0868 [10]; **21e**: 0914 [4]; **30b**: 1135 [1].

### *Polypodiaceae*

*Anogramma leptophylla* (L.) Link – **CB NE** – annual.

**5**: 0204 [3]; **8d**: 0317 [1]; **17d**: 0723 [10].

*Asplenium ceterach* L. – **DT NE VM** – perennial .

**12b:** 0495 [6]; **16:** 0630 [6]; **17e:** 0724 [4]; **28e:** 1066 [4].

*Asplenium obovatum* Viv. – **K** – tufted perennial.

**34e:** 1227 [8].

*Asplenium onopteris* L. – **K** – perennial.

**34c:** 1217 [8].

*Asplenium trichomanes* L. – **K** – perennial, rachis brown.

**34e:** 1209 [2]; **39:** 1329 [7]; **41c:** 1341 [10]; **42b:** 1347 [9].

*Cheilanthes acrostica* Tod. – **DT**.

**12b:** 0497 [3].

*Cosentinia vellea* (Aiton) Tod. – **NE** – perennial.

**17e:** 0719 [6].

*Polypodium cambricum* L. – **K NE** – rhizomatose perennial.

**17e:** 0721 [13]; **34b:** 1219 [17]; **36:** 1267 [5]; **39:** 1314 [5].

*Polystichum setiferum* (Forssk.) Woyнар – **K** – tufted perennial.

**34:** 1218 [11].

*Pteridium aquilinum* (L.) Kuhn – **K** – rhizomatose perennial.

**34:** 1222 [10].

### *Selaginellaceae*

*Selaginella denticulata* (L.) Spring – **CB DT K NE VM** – perennial.

**1:** 0069 [4]; **5:** 0187 [10]; **8:** 0332 [4]; **12b:** 0496 [3]; **17:** 0725 [10]; **28:** 1065 [5]; **34:** 1221 [3].

### GYMNOSPERMAE

#### *Cupressaceae*

*Juniperus macrocarpa* Sm. – **NE** – shrub 1 m.

**18:** 0793 [10].

*Juniperus turbinata* Guss. – **CB M NE** – shrub 1-3 m.

**5:** 0202 [9]; **17:** 0745 [11]; **18:** 0775 [9]; **21:** 0916 [4] (juvenile).

*Tetraclinis articulata* (Vahl) Mast. – **DT** – shrub or small tree 4-6 m.

**1:** 0044 [7]; **15:** 0549 [10]; **16:** 0597 [7].

#### *Ephedraceae*

*Ephedra fragilis* Desf. – **NE** – straggling shrub 1-1.5 m.

**17e:** 0728 [13]; **26:** 1004 [13].

#### *Pinaceae*

*Pinus halepensis* Mill. – **DT** – tree 5 m.

**1:** 0040 [5]; **12:** 0446 [11].

*Pinus pinaster* Aiton – **K** – partly planted, also spontaneous tree 14 m.

**30:** 1124 [14].

**DICOTYLEDONES****Acanthaceae**

*Acanthus platyphyllus* (Murb.) Prain – **CB K NE** – perennial.

**8c:** 0319 [10] (sterile); **17:** 0735 [10] (in bud); **34:** 1203 [7] (sterile); **42:** 1361 [3] (only leaves).

This taxon is clearly morphologically and taxonomically isolated from *A. mollis* L. deserving to be considered a separated species.

**Aizoaceae**

*Carpobrotus edulis* (L.) N. E. Br. – **NE** – creeping perennial, flowers yellow or purplish pink.

**18b:** 0800 [6].

**Anacardiaceae**

*Pistacia lentiscus* L. – **CB DT NE** – shrub, 1-3 m .

**1:** 0039 [10]; **5:** 0179 [10]; **11d:** 0375 [9]; **17:** 0688 [10].

**Apocynaceae**

*Nerium oleander* L. – **VM** – shrub 1.5 m.

**28b:** 1062 [10] (in fruit).

*Periploca angustifolia* Labill. – **DT NE** – shrub 1,5 m, flowers dark purplish brown, margin and outside green.

**1:** 0017 [8]; **16:** 0551 [10] (in fruit); **17:** 0635 [11].

*Vinca major* L. – **K** – perennial, 40 cm, long runners, flowers pale violet.

**40:** 1333 [17].

**Aquifoliaceae**

*Ilex aquifolium* L. – **K** – evergreen tree, 5 m.

**42:** 1353 [12].

**Araliaceae**

*Hedera algeriensis* Hibberd – **CB K** –, trailing or climbing.

**8d:** 0314 [10] (sterile); **34:** 1202 [16] (in fruit).

**Aristolochiaceae**

*Aristolochia navicularis* Nardi – **K NE** – perennial, perigon tube pale greenish yellow with pale greenish-brown limb.

**8f:** 0780 [13]; **37:** 1280 [7].

**Betulaceae**

*Alnus glutinosa* (L.) Gaertn. – **K** – tree 10 m.

**32:** 1173 [12].

**Boraginaceae**

*Alkanna tinctoria* Tausch – **CB NE** – prostrate perennial, flowers deep blue with purple eye and tube.

**7:** 0273 [3]; **11g:** 0367 [8]; **18e:** 0756 [9]; **25:** 0970 [13].

*Anchusa azurea* Mill. – **VM** – annual, flowers deep blue, tube purple.

**28:** 1083 [9].

*Borago officinalis* L. – **CB M VM** – annual or perennial, flowers bright blue.

**11:** 0394 [10]; **20:** 0884 [10]; **28:** 1086 [4].

*Cerintho major* L. – **VM** – flowers black purple proximally, yellow distally.

**28:** 1070 [15].

*Cynoglossum cheirifolium* subsp. *heterocarpum* (Kunze) Maire – **CB DT VM** – annual or biennial, flowers whitish turning pale purplish, venation inconspicuous.

**7:** 0270 [9]; **12:** 0483 [3]; **28:** 1068 [12].

*Cynoglossum creticum* Mill. – **CB** – biennial, flowers purple turning blue, with net of dark veins.

**11j:** 0426 [6].

*Echium parviflorum* Moench – **CB DT NE VM** – flowers blue.

**1b:** 0035 [10]; **11:** 0393 [8]; **13:** 0498 [8]; **16:** 0558 [8]; **17:** 0639 [1]; **28:** 1076 [9].

*Echium plantagineum* L. – **VM** – biennial, flowers purple.

**28:** 1085 [9].

*Echium sabulicola* subsp. *decipiens* (Pomel) G. Klotz – **CB NE** – perennial, flowers dark bluish violet.

**6:** 0238 [10]; **18e:** 0758 [9].

*Myosotis discolor* Pers. – **M** – annual, flowers pale blue with yellow centre.

**19:** 0858 [7].

*Myosotis ramosissima* Rochel – **K** – annual, flowers blue.

**36:** 1246 [7]; **37:** 1282 [4].

*Nonea vesicaria* (L.) Rchb. – **CB** – perennial, flowers dark brownish violet.

**6d:** 0216 [11]; **11c:** 0391 [11].

### *Cactaceae*

*Opuntia maxima* Mill. – **VM**.

**28c:** 1058 [5] (sterile).

### *Callitricheaceae*

*Callitriche obtusangula* Le Gall – **K**.

**32b:** 1192 [10].

*Callitriche stagnalis* Scop. – **M** – annual.

**19c:** 0819 [15]; **20b:** 0912 [12] (aerial).

### *Campanulaceae*

*Campanula erinus* L. – **NE** – annual, flowers pale blue.

**17:** 0665 [3].

### *Caprifoliaceae*

*Viburnum tinus* L. – **K M** – shrub, 3 m, evergreen, flowers white.

**21:** 0938 [12] (in fruit); **39:** 1315 [13].

*Caryophyllaceae*

*Arenaria cerastioides* Poir. – **M** – annual, flowers white, anthers dark blue.

**19:** 0813 [21]; **21:** 0935 [11]; **29c:** 1108 [8].

*Arenaria leptoclados* (Rchb.) Guss. – **DT K NE** – annual, flowers white.

**16:** 0600 [13]; **17:** 0705 [3]; **32d:** 1190 [3].

*Cerastium diffusum* subsp. *gussonei* (Lojac.) P. D. Sell & Whitehead – **K** – annual, flowers white.

**32d:** 1188 [7].

*Cerastium glomeratum* Thuill. – **CB K M NE** – annual, flowers white.

**5:** 0192 [10]; **8:** 0321 [14]; **11k:** 0419 [10]; **17:** 0691 [12]; **19:** 0823 [15]; **21:** 0934 [9]; **29e:** 1103 [9]; **32d:** 1187 [7]; **34:** 1216 [12]; **36:** 1259 [15]; **37:** 1292 [4]; **39:** 1324 [7].

*Dianthus rupicola* subsp. *hermaeensis* (Cosson) O. Bolòs & Vigo – **CB** – subshrub.

**8d:** 0305 [11] (sterile).

*Herniaria hirsuta* L. – **CB** – annual.

**5:** 0211 [1].

*Minuartia mediterranea* (Ledeb.) K. Malý – **DT K NE** – annual, flowers white.

**16:** 0601 [3]; **17:** 0704 [4]; **32d:** 1189 [1].

*Moehringia pentandra* Gay – **M** – annual, flowers white.

**19:** 0811 [1].

*Moenchia erecta* (L.) P. Gaertner & al. – **K M** – annual, flowers white.

**19:** 0848 [5]; **36:** 1260 [7]; **37:** 1287 [1].

*Paronychia argentea* Lam. – **CB DT K M** – prostrate perennial.

**4:** 0115 [10]; **5:** 0198 [10]; **7:** 0281 [3]; **12:** 0447 [9]; **15:** 0533 [15]; **29e:** 1102 [19]; **37:** 1289 [12].

*Paronychia capitata* (L.) Lam. – **DT** – decumbent perennial.

**1:** 0008 [1]; **13:** 0500 [6].

*Paronychia echinulata* Chater – **CB M** – annual.

**8:** 0324 [2]; **19:** 0863 [6].

*Petrorhagia prolifera* (L.) P. W. Ball & Heywood – **M** – annual.

**21:** 0915 [3] (in bud).

*Polycarpon polycarpoides* (Biv.) Zodda – **DT** – perennial.

**1:** 0052 [4]; **16:** 0592 [10].

*Polycarpon tetraphyllum* (L.) L. – **CB K** – annual.

**5:** 0193 [3]; **39:** 1326 [7].

*Polycarpon tetraphyllum* subsp. *alsinifolium* (Biv.) Ball – **CB NE** – annual.

**6:** 0247 [14]; **18:** 0795 [10].

*Rhodalsine geniculata* (Poir.) F. N. Williams – **M** – decumbent perennial, flowers pale pink.

**29e:** 1109 [12].

*Sagina apetala* Ard. – **CB K M** – annual.

**5:** 0196 [12]; **19:** 0851 [4]; **36:** 1238 [4].

*Sagina maritima* G. Don – **NE** – annual.

**18f:** 0779 [2].

*Silene barrattei* Murb. – **NE** – perennial, flowers pale pink.

**18:** 0789 [10].

*Silene colorata* Poir. – **CB DT NE** – annual, flowers bright purplish pink, tips of coronal scales whitish – **5:** 0180 [14]; **7:** 0275 [14]; **11:** 0424 [10]; **15:** 0536 [12]; **16:** 0596 [10]; **18:** 0778 [10]; **25:** 0974 [7].

*Silene gallica* L. – **CB DT M** – annual, flowers pale pink, unblotched .  
**11:** 0423 [4]; **15:** 0534 [1]; **20:** 0893 [4]; **21:** 0933 [1]; **29e:** 1110 [10].

*Silene nocturna* L. – **CB K M** – annual, flowers pale pink, dirty outside.  
**4** –0129 [7]; **29e:** 1104 [9]; **31:** 1158 [3].

*Silene succulenta* Forssk. – **CB NE** – fleshy-leaved perennial, flowers white inside, dirty purple outside.  
**6:** 0252 [10]; **18:** 0788 [3]; **26:** 1006 [15].

*Silene tunetana* Murb. – **DT M VM** – annual, flowers uniformly pink or with a whitish aureola around a dark purple eye, and with pale coronal scales.  
**16:** 0595 [11]; **20:** 0876 [12]; **28:** 1063 [10].

*Spergula arvensis* L. subsp. *arvensis* – **CB** – annual, to 15 cm.  
**5:** 0205 [8].

*Spergularia bocconei* (Scheele) Graebner – **CB**.  
**4:** 0127 [1].

*Spergularia maritima* subsp. *tunetana* (Maire) Greuter & Burdet – **CB** – flowers pink.  
**4:** 0118 [11].

*Spergularia salina* J. Presl & C. Presl – **CB** – annual.  
**6e:** 0253 [15].

*Stellaria media* (L.) Vill. – **CB DT K M NE** – annual, flowers white.  
**5:** 0194 [10]; **8b:** 0320 [10]; **11k:** 0419a [1]; **12:** 0448 [11]; **17:** 0690a [10]; **25:** 0976 [5]; **25:** 0999 [2]; **26c:** 1012 [4]; **29:** 1119 [14]; **36:** 1261 [1]; **39:** 1325 [9]; **41:** 1338 [6 p.p.].

**Note.** – *Stellaria media* and *Stellaria pallida* often grow intermingled and are closely similar in appearance, which explains why many of our gatherings resulted to be mixed; nevertheless, on closer inspection the species are well distinct and do not appear to intergrade.

*Stellaria neglecta* Weihe – **K** – annual, flowers white, 10 stamens.  
**34:** 1214 [10].

*Stellaria pallida* (Dumort.) Piré – **CB DT K M NE** – annual, flowers apetalous or white.  
**5:** 0194a [10 p.p.]; **8b:** 0329 [6]; **12:** 0448a [11 p.p.]; **17:** 0690 [10 p.p.]; **19:** 0854 [1]; **26c:** 1014 [5]; **41:** 1338a [6 p.p.].

### Casuarinaceae

*Casuarina cunninghamiana* Miq. – **NE** – tree 10 m, planted.  
**25:** 1001 [10].

### Chenopodiaceae

*Arthrocnemum macrostachyum* (Moric.) K. Koch – **CB** – shrub or creeping shrublet.  
**4:** 0119 [11]; **6e:** 0217 [10]; **6e:** 0248 [11].

*Beta maritima* L. – **CB** – perennial.  
**6c:** 0240 [8].

*Chenopodium murale* (L.) S. Fuentes & al. – **CB DT M** – annual.  
**2:** 0076 [9]; **6c:** 0259 [10]; **29:** 1118 [19].

*Emex spinosa* (L.) Campd. – **CB NE** – perennial.

**6c:** 0260 [7]; **17f:** 0712 [1].

*Halimione portulacoides* (L.) Aellen – **CB**.

**4:** 0114 [10].

*Halocnemum cruciatum* (Forssk.) Console & Tod. – **CB**.

**4:** 0113 [9].

**Note.** – According to Bacchetta & al. (2012) there are morphological differences between the populations of *Halocnemum* found around the Mediterranean and those from the saline shores of Lake Inder north of the Caspian Sea, in W Kazakhstan, that had been described in 1771 as *Salicornia strobilacea* Pallas. These authors adopted the name *H. cruciatum*, based on *S. cruciata* Forssk. from Alexandria of Egypt, for the circummediterranean plants previously known as *Halocnemum strobilaceum* (Pallas) M. Bieb. Independently, Papini & al. (2004) had found significant differences, at the DNA level, between *Halocnemum* plants from the delta of the river Po in NE Italy and those near Cagliari in S Sardinia. More recently, Biondi & al. (2013, 2014) have demonstrated that two clearly separable species indeed exist, differing in morphology (including seed microcharacters) as well as ecology, but that only the S Mediterranean plants (from Spain, Sardinia, Sicily, S Anatolia, Cyprus and the whole of N Africa) belong to *H. cruciatum*, whereas those of peninsular Italy, Greece and Turkey-in-Europe remain in *H. strobilaceum*.

*Sarcocornia perennis* (Mill.) A. J. Scott – **CB**.

**4:** 0120 [10].

*Suaeda vera* J. F. Gmel. – **CB** – decumbent shrub.

**4:** 0126 [9]; **7:** 0284 [9].

### **Cistaceae**

*Cistus clusii* Dunal – **DT** – shrub, 50 cm, flowers white.

**1:** 0001 [10].

*Cistus creticus* subsp. *eriocephalus* (Viv.) Greuter & Burdet – **CB DT** – shrub, 0.8-1.5 m, flowers pink with yellow eye.

**1:** 0011 [10]; **11d:** 0385 [10]; **12:** 0487 [10].

*Cistus monspeliensis* L. – **CB DT K M NE** – shrub 0.4-1 m, flowers white with yellow eye.

**5:** 0195 [10]; **12:** 0486 [10]; **16:** 0561 [12]; **17:** 0700 [7]; **19:** 0822 [10]; **21:** 0924 [9]; **29c:** 1105 [10]; **31:** 1155 [10]; **36:** 1257 [10].

*Cistus salviifolius* L. – **DT K M NE** – shrub, 20-80 cm, flowers white with yellow eye, sepals normally pubescent but often glabrous, purple in centre.

**1:** 0014 [7]; **12:** 0488 [10]; **18:** 0799 [11]; **25:** 0995 [10]; **29c:** 1117 [7]; **30:** 1138 [11]; **37:** 1290 [7]; **37:** 1291 [5]; **39:** 1327 [10]; **41:** 1339 [3]. **41:** 1339a [4]; **42:** 1359 [7]; **42:** 1360 [7].

*Fumana arabica* (L.) Spach – **DT** – shrublet 30-50 cm, flowers yellow.

**1:** 0042 [10]; **12:** 0490 [5].

*Fumana laevipes* (L.) Spach – **DT** – shrublet 20 cm, flowers yellow.

**1:** 0021 [10].

*Fumana scoparia* Pomel – **DT:** 15 cm, flowers yellow.

**1:** 0054 [1].



- Fumana thymifolia* (L.) Webb – **CB DT K M** – shrublet 20-30 cm, flowers yellow.  
**1:** 0033 [11]; **3:** 0090 [6]; **5:** 0184 [11]; **16:** 0562 [10]; **21:** 0927 [4]; **29c:** 1106 [7]; **30:** 1137 [3]; **31:** 1156 [11].
- Halimium halimifolium* (L.) Willk. – **K M** – shrub 40-50 cm.  
**29c:** 1113 [10] (old fruits); **30:** 1136 [9] (fruit remains).
- Helianthemum croceum* (Desf.) Pers. – **DT** – suffrutex 20 cm, flowers yellow.  
**16:** 0565 [14].
- Tuberaria guttata* (L.) Fourr. – **CB** – perennial, flowers yellow.  
**8:** 0330 [3].
- Tuberaria lignosa* (Sweet) Samp. – **K** – perennial.  
**30:** 1128 [3] (in bud).
- Tuberaria lipopetala* (Murb.) Greuter & Burdet – **CB** – annual, petals yellow, unspotted.  
**8:** 0333 [2].
- Compositae**
- Achillea maritima* (L.) Ehrend. & Y. P. Guo – **CB** – perennial.  
**6:** 0256 [11].
- Anacyclus clavatus* (Desf.) Pers. – **DT NE** – annual, ray flowers white, disk yellow.  
**1b:** 0010 [6]; **17:** 0713 [3].
- Andryala integrifolia* L. – **VM** – perennial, flowers lemon yellow.  
**28:** 1023 [1].
- Andryala laxiflora* DC. – **DT** – annual, in bud.  
**16:** 0634 [2].
- Anthemis secundiramea* Biv. – **CB** – annual, ray flowers white, disk yellow.  
**5:** 0143 [4]; **8:** 0291 [1]; **10:** 0349 [4].
- Anthemis ubensis* Pomel – **DT NE** – annual, ray flowers white.  
**15:** 0516 [1]; **25:** 0952 [2].
- Arctotheca calendula* (L.) Levyns – **M** – stoloniferous perennial, ray flowers yellow, lead-coloured outside, disk dark purple.  
**20:** 0899 [4].
- Artemisia arborescens* L. – **NE** – shrub, 1.5 m.  
**17e:** 0707 [9] (sterile).
- Bellis annua* L. – **CB K NE VM** – annual, to 6 cm, ray flowers white, disk yellow.  
**4:** 0108 [4]; **5:** 0150 [2]; **6c:** 0230 [3]; **8:** 0293 [2]; **18d:** 0794 [8]; **25:** 0987 [2]; **28:** 1024 [2]; **32:** 1193 [2]; **41:** 1334 [8].
- Bellis prostrata* Pomel – **M** – perennial, ray flowers white.  
**19:** 0859 [4].
- Bellis sylvestris* Cirillo – **CB DT K M** – perennial, to 30 cm, ray flowers whitish-pink, disk yellow.  
**1:** 0027 [6]; **5:** 0145 [4]; **8:** 0289 [5]; **12:** 0432 [4]; **19:** 0845 [2]; **34:** 1212 [8]; **39:** 1330 [4].
- Calendula arvensis* L. – **CB DT K NE VM** – 40 cm, annual, ray flowers orange, rarely yellow, disk sometimes blackish purple.  
**1b:** 0015 [5]; **4:** 0097 [3]; **6c:** 0221 [5]; **15:** 0510 [3]; **17:** 0718 [3]; **28:** 1020 [6]; **38:** 1304 [7].

- Calendula stellata* Cav. – **CB DT VM** – annual or perennial, 20 cm, flowers orange.  
**5:** 0155 [4]; **12:** 0433 [8]; **28:** 1021 [6].
- Carduus getulus* Pomel – **CB** – perennial or biennial.  
**5:** 0197 [3].
- Carduus spachianus* Dur. – **CB DT M NE** – normally annual, 1 m, flowers dark lilac to purplish pink.  
**1b:** 0003 [9]; **5:** 0134 [9]; **11:** 0362 [7]; **17:** 0715 [3]; **20:** 0946 [10]; **25:** 0959 [10].
- Carthamus pinnatus* Desf. – **DT VM** – acaulescent perennial.  
**1:** 0025 [5]; **28:** 1027 [3] (in bud).
- Centaurea calcitrapa* L. – **K M** – perennial.  
**20:** 0905 [6] (in bud); **32:** 1194 [8] (in bud).
- Centaurea napifolia* L. – **CB** – perennial, radiate flowers purple.  
**11:** 0369 [10].
- Centaurea sphaerocephala* L. – **NE** – perennial.  
**18:** 0796 [3] (in bud); **25:** 0954 [9] (in bud).
- Chamaemelum fuscatum* (Brot.) Vasc. – **CB M** – annual, 20 cm, ray flowers white, disk yellow.  
**5b:** 0139 [3]; **19:** 0843 [2].
- Cichorium intybus* L. – **CB**.  
**11:** 0425 [1] (in bud).
- Coleostephus myconis* (L.) Rchb. f. – **CB DT NE VM** – annual, 30 cm, ray flowers yellow or white with yellow base.  
**5:** 0144 [3]; **16:** 0606 [3]; **25:** 0953 [4]; **28:** 1022 [8].
- Cotula coronopifolia* L. – **CB M NE** – perennial, flowers yellow.  
**4b:** 0098 [6]; **17c:** 0716 [10]; **21d:** 0945 [3].
- Crepis vesicaria* L. – **CB DT** – perennial, 20 cm, ligules yellow, outside often reddish.  
**1b:** 0029 [5]; **5b:** 0147 [4]; **12:** 0435 [8]. **12:** 0435a [1].
- Dittrichia viscosa* (L.) Greuter – **DT**.  
**1:** 0050 [3].
- Erigeron bonariensis* L. – **CB K** – annual (sometimes perennial?), 10 cm, flowers brownish.  
**4:** 0112 [2]; **7b:** 0265 [4]; **38:** 1302 [4].
- Filago argentea* (Pomel) Chrtek & Holub – **DT** – annual.  
**15:** 0509 [2].
- Filago gallica* L. – **CB DT M** – annual.  
**5:** 0186 [1]; **8:** 0292 [2]; **15:** 0535 [3]; **19:** 0847 [5].
- Filago pygmaea* L. – **CB NE** – annual, to 5 cm.  
**4:** 0105 [3]; **5:** 0146 [2]; **5:** 0190a [1]; **8:** 0286 [3]; **10:** 0351 [2]; **17:** 0711 [13] (in bud); **17:** 0717 [3].
- Galactites tomentosus* Moench – **CB** – annual, radiating flowers pale lilac.  
**10:** 0353 [7].
- Glebionis coronaria* (L.) Spach – **CB** – annual, flowers yellow.  
**6d:** 0214 [5].
- Hedypnois rhagadioloides* (L.) F. W. Schmidt – **CB DT M NE** – annual, to 10 cm, ligules yellow.  
**4:** 0099 [3]; **5:** 0164a [1]; **5b:** 0148 [4]; **7b:** 0264a [1]; **11:** 0368 [4]; **15:** 0511 [2]; **15:** 0512 [2]; **17:** 0697 [5]; **17:** 0722 [10]; **20:** 0911 [5].

- Helichrysum stoechas* subsp. *barrelieri* (Ten.) Nyman – **CB NE** – ± decumbent subshrub, 20 cm, bracts lemon yellow.  
**10:** 0342 [11]; **18:** 0774 [4].
- Helminthotheca aculeata* (Vahl) Lack – **DT** – perennial.  
**12:** 0438 [1] (sterile).
- Hyoseris lucida* L. – **NE** – perennial, ligules yellow.  
**18:** 0781 [7].
- Hyoseris radiata* L. – **CB DT K NE VM** – perennial, 20 cm, ligules yellow tinged greenish-purple outside, sometimes with purple teeth.  
**1:** 0028 [3]; **8:** 0288 [9]; **16b:** 0607 [10]; **17:** 0702 [6]; **28:** 1019 [8]; **36:** 1264 [10].
- Hyoseris scabra* L. – **CB NE VM** – annual, 1-2 cm, ligules pale yellow.  
**4:** 0110 [5]; **5:** 0160 [5]; **17:** 0720 [2]; **28:** 1025 [4].
- Hypochaeris achyrophorus* L. – **CB DT NE** – annual, 15-40 cm, ligules yellow, outside reddish.  
**1:** 0038 [2]; **1b:** 0041 [1]; **7b:** 0264 [3]; **10:** 0350 [2]; **14:** 0507 [4]; **16:** 0590 [7]; 0698 [3]; **18:** 0785 [9].
- Hypochaeris glabra* L. – **CB** – annual, ligules yellow.  
**6c:** 0224 [4].
- Hypochaeris laevigata* (L.) Ces. & al. – **K DT** – perennial, ligules yellow.  
**12:** 0436 [4] (in bud); **36:** 1263 [4].
- Jacobaea delphinifolia* (Vahl) Pelsner & Veldkamp – **M** – annual, flowers yellow.  
**20:** 0904 [7].
- Laphangium luteoalbum* (L.) Tsvelev – **CB** – annual.  
**5:** 0190 [1].
- Launaea fragilis* (Asso) Pau – **DT** – perennial.  
**15:** 0541 [5] (in bud).
- Leontodon tuberosus* L. – **CB DT M** – perennial geophyte, to 30 cm, ligules yellow, outside reddish.  
**1b:** 0034 [3]; **5:** 0158 [10]; **8:** 0285 [5]; **19:** 0844 [9].
- Micropus supinus* L. – **CB** – annual.  
**5:** 0185 [1].
- Osteospermum* (hybr.) – **K** – perennial, flowers pale lavender, bluish violet outside; cultivated for ornament and escaping.  
**31b:** 1150 [1].
- Pallenis maritima* (L.) Greuter – **CB M NE** – perennial, ligules yellow, red outside.  
**10:** 0340 [6]; **18b:** 0786 [6]; **29:** 1089 [5].
- Pallenis spinosa* (L.) Cass. – **CB DT** – perennial, flowers lemon yellow.  
**1:** 0045 [2]; **11:** 0371 [2].
- Phagnalon rupestre* subsp. *illyricum* (H. Lindb.) Ginzb. – **CB DT** – suffrutex 30-40 cm, flowers yellowish.  
**1:** 0004 [7]; **5:** 0140 [4]; **11:** 0363 [10]; **12:** 0434 [5].
- Phagnalon saxatile* (L.) Cass. – **DT NE** – suffrutex 30 cm.  
**14:** 0506 [10]; **16:** 0618 [15]; **17:** 0714 [6].
- Picris sinuata* (Lam.) Lack – **CB NE** – perennial.  
**6:** 0215 [10]; **10b:** 0335 [4] (sterile); **25:** 0956 [10] (sterile).

*Plagiush maghrebinus* Vogt & Greuter – **K** – shrub to 1.2 m.

**34:** 1207 [13] (sterile).

*Podospermum laciniatum* (L.) DC. – **CB:** 10-20 cm, ligules yellow.

**4:** 0111 [10].

*Reichardia intermedia* (Sch. Bip.) Samp. – **CB DT** – ligules yellow.

**1b:** 0032a [1]; **5:** 0164 [2]; **12:** 0437 [4]; **16:** 0594 [3].

*Reichardia picroides* (L.) Roth – **CB DT NE** – perennial, ligules yellow.

**1b:** 0032 [4]; **10:** 0337 [3]; **18:** 0765 [2].

*Rhaponticum acaule* (L.) DC. – **VM** – acaulescent perennial, flowers pale yellow.

**28:** 1026 [1].

*Scorzonera coronopifolia* Desf. – **DT** – geophyte, outer ligules yellow, reddish outside, central flowers dark purple.

**12:** 0431 [4]; **16:** 0593 [1].

*Scorzonera undulata* subsp. *deliciosa* (DC.) Maire – **DT M NE VM** – perennial geophyte, ligules pink.

**15:** 0508 [2]; **16:** 0589 [10]; **17:** 0699 [2]; **19:** 0852 [5]; **28:** 1064 [2].

*Senecio leucanthemifolius* Poir. – **CB** – annual, flowers yellow.

**8:** 0287 [2].

*Senecio leucanthemifolius* subsp. *mauritanicus* (Pomel) Greuter – **CB DT** – annual, to 30 cm, flowers yellow.

**1b:** 0047 [3]; **5:** 0161 [2]; **6:** 0220 [11]; **12:** 0430 [2].

*Senecio leucanthemifolius* var. *vernus* (Biv.) Fiori – **NE** – annual, ligules yellow.

**18:** 0764 [3]; **25:** 0951 [2]; **29:** 1090 [2].

*Senecio lividus* L. – **M** – annual, flowers yellow.

**19:** 0850 [10].

*Senecio vulgaris* L. – **K** – annual, flowers yellow.

**34:** 1213 [4]; **37:** 1281 [3]; **39:** 1331 [4].

*Sonchus asper* (L.) Hill – **M** – annual, ligules yellow, reddish outside.

**20:** 0898 [3].

*Sonchus bulbosus* (L.) N. Kilian & Greuter – **CB K NE** – geophyte, to 20 cm, ligules yellow, purplish tinged outside.

**4:** 0100 [4]; **6c:** 0223 [3]; **26:** 1003 [4]; **31:** 1149 [3].

*Sonchus oleraceus* L. – **DT** – 70 cm, ligules yellow.

**1b:** 0013 [5].

*Sonchus tenerrimus* L. – **CB NE** – annual to 30 cm, ligules yellow.

**5:** 0162 [2]; **17:** 0696 [8]; **25:** 0955 [4].

*Urospermum dalechampii* (L.) F. W. Schmidt – **CB** – perennial to 40 cm, ligules sulphur yellow, purple outside.

**11:** 0364 [9]; **28:** 1028 [5].

*Urospermum picroides* (L.) F. W. Schmidt – **DT K NE** – annual, ligules yellow.

**1b:** 0019 [2]; **17:** 0706 [8]; **39:** 1332 [2].

### *Convolvulaceae*

*Convolvulus durandoi* Pomel – **K M** – decumbent perennial, flowers pale purplish pink with dark veins in throat and purple stripes outside.

**19:** 0810 [10]; **31:** 1152 [7].

*Convolvulus siculus* L. – **DT NE** – annual, flowers blue.

**16:** 0552a [1]; **17:** 0675 [3].

*Convolvulus tricolor* L. subsp. *tricolor* – **M VM** – perennial, flowers blue with a yellow corona around a white centre.

**20:** 0906 [5]; **28:** 1071 [3].

*Convolvulus tricolor* subsp. *cupanianus* (Sa'ad) Stace – **DT** – annual, flowers blue with a yellow corona around a white centre.

**16:** 0552 [13].

### *Crassulaceae*

*Crassula tillaea* Lester-Garland – **K** – annual.

**36:** 1236 [9].

*Sedum caeruleum* L. – **CB K** – annual.

**5:** 0181 [2] (sterile); **36:** 1266 [3] (in bud).

*Sedum cepaea* L. – **K** – annual.

**34:** 1226 [3] (sterile).

*Sedum dasyphyllum* L. – **CB** – perennial.

**8d:** 0309 [3] (sterile).

*Sedum stellatum* L. – **NE** – annual.

**17:** 0640 [10] (with old fruits).

*Sedum tuberosum* Coss. & Letourn. – **K** – perennial.

**31:** 1162 [4] (with old fruits).

*Umbilicus horizontalis* (Guss.) DC. – **NE** – geophyte.

**17:** 0641 [2] (with old fruits); **17:** 0641a [6] (with old fruits).

### *Cruciferae*

*Arabidopsis thaliana* (L.) Heynh. – **K** – annual, flowers white..

**36:** 1250a [2];

*Biscutella didyma* L. – **CB DT M NE** – annual, to 50 cm, flowers pale yellow.

**5:** 0163 [10]; **8:** 0325 [4]; **12:** 0452 [4]; **16:** 0631 [10]; **18e:** 0762 [10]; **19:** 0836 [10];  
**20:** 0889 [10]; **25:** 0978 [9].

*Brassica gravinae* Ten. – **DT** – perennial, flowers pale yellow.

**1:** 0064a [2]; **12b:** 0492 [10]; **13:** 0505 [4].

*Brassica napus* L. – **M** – perennial, flowers yellow.

**20:** 0900 [8].

*Brassica souliei* subsp. *amplexicaulis* (Desf.) Greuter & Burdet – **DT** – annual, flowers yellow.

**16:** 0629 [10].

*Cakile maritima* Scop. subsp. *maritima* – **CB** – annual, flowers purplish pink.

**6:** 0242 [8].

*Capsella* × *gracilis* Godr. – **CB K** – annual, to 60 cm, flowers white.

**5:** 0174b [1]; **36:** 1262a [2]; **38:** 1307b [2].

*Capsella bursa-pastoris* (L.) Medik. – **CB K M** – annual, to 60 cm, flowers white or pinkish.

**5:** 0174a [4]; **19:** 0838 [1]; **38:** 1307 [6].

- Capsella rubella* Reut. – **CB DT K NE** – annual, to 25 cm, flowers white or pinkish.  
**5:** 0174 [2]; **12:** 0450 [2]; **17:** 0747 [4]; **32b:** 1184 [2]; **36:** 1262 [6]; **38:** 1307a [1].
- Cardamine hirsuta* L. – **CB DT K M** – annual, flowers white.  
**8b:** 0323 [3]; **12:** 0449 [5]; **19:** 0870 [3]; **36:** 1250 [4]; **43:** 1366 [2].
- Diplotaxis eruroides* (L.) DC. – **CB DT** – 50 cm, flowers white or pinkish.  
**2:** 0078 [3]; **4:** 0130 [4].
- Diplotaxis muralis* (L.) DC. – **DT** – annual, flowers pale yellow.  
**3:** 0095 [1]; **12:** 0494 [5].
- Diplotaxis simplex* (Viv.) Spreng. – **CB** – flowers pale yellow.  
**5:** 0203 [5].
- Diplotaxis virgata* (Cav.) DC. – **DT K** – hapaxanthous ?, 60 cm, flowers yellow.  
**1:** 0064 [5]; **38:** 1310 [11].
- Erophila verna* (L.) Chevall. – **K** – annual, flowers white.  
**36:** 1251 [11].
- Eruca sativa* subsp. *longirostris* (Uechtr.) Jahand. & Maire – **CB** – annual, flowers pale yellow with violet veins.  
**7:** 0278 [12]; **10:** 0358 [4].
- Hirschfeldia incana* (L.) Lagr.-Foss. – **CB DT K NE** – annual, 70-100 cm, flowers yellow.  
**2:** 0081 [9]; **7:** 0279 [8]; **10:** 0352 [10]; **12:** 0451 [6]; **15:** 0538 [2]; **16:** 0632 [4]; **17:** 0753 [9]; **38:** 1303 [6].
- Lepidium glastifolium* Desf. – **K** – perennial, flowers white.  
**36:** 1245 [3].
- Lobularia maritima* (L.) Desv. – **CB DT NE** – annual, flowers white, honey-scented.  
**5:** 0178 [12]; **11:** 0421 [10]; **15:** 0539 [10]; **17:** 0732 [3]; **25:** 1000 [1].
- Malcolmia doumetiana* (Coss.) Rouy – **CB NE** – annual, flowers white to pale pink.  
**6:** 0237 [11]; **18:** 0798 [11]; **25:** 0997 [13].
- Moricandia arvensis* (L.) DC. – **DT** – flowers pink.  
**3:** 0093 [6].
- Nasturtium officinale* R. Br. – **K** – perennial, flowers white.  
**32b:** 1186 [14].
- Raphanus raphanistrum* L. – **CB K NE** – annual or biennial? to 70 cm, flowers pale yellow with pink to violet veins outside.  
**5:** 0209 [1]; **27:** 1017 [5]; **38:** 1308 [11].
- Rapistrum rugosum* (L.) All. – **CB** – annual, flowers pale yellow.  
**6c:** 0254 [1]; **11:** 0428 [4].
- Sinapis alba* L. – **VM** – annual, flowers yellow.  
**28:** 1050 [5].
- Sinapis arvensis* L. – **DT** – annual, flowers yellow.  
**15:** 0538a [4].
- Sisymbrium irio* L. – **DT** – flowers yellow.  
**3:** 0094 [7].
- Sisymbrium officinale* (L.) Scop. – **M NE** – annual, flowers pale yellow.  
**17:** 0738 [5]; **29:** 1116 [11].

**Cynomoriaceae****Cynomorium coccineum** L. – **CB**.**4:** 0101 [13].**Cytinaceae****Cytinus hypocistis** subsp. **macranthus** Wettst. – **CB K** – on *Halimium halimifolium*, flowers bright yellow, scales orange red.**5:** 0135 [5]; **30:** 1129 [11].**Ericaceae****Arbutus unedo** L. – **K** – tree, 3 m.**36:** 1234 [11].**Erica arborea** L. – **CB K M** – shrub, to 2 m (30 cm when grazed), flowers white or pinkish.**5:** 0177 [12]; **8:** 0313 [10]; **19:** 0825 [9]; **34:** 1198 [10]; **36:** 1254 [10].**Erica multiflora** L. – **DT** – shrub, 1.5-2 m, flowers pink.**1:** 0055 [11]; **12:** 0458 [8].**Erica scoparia** L. – **K M** – shrub 1.5 m.**19:** 0832 [8] (in bud); **30:** 1125 [10] (in bud).**Euphorbiaceae****Euphorbia amygdaloides** L. – **K** – hapaxanthous.**39:** 1316 [3]; **42:** 1354 [14].**Euphorbia bivonae** Steudel – **CB NE** – shrub 0.3-1 m, or hanging shrub 4-5 m.**5:** 0176 [16]; **17:** 0644 [12].**Euphorbia dendroides** L. – **DT** – shrub to small tree 1.5-2 m, cyathium glands yellow.**12:** 0477 [10]; **16:** 0564 [6].**Euphorbia exigua** L. – **DT M NE** – annual.**16:** 0610 [3]; **17:** 0680 [4]; **19:** 0873 [1].**Euphorbia helioscopia** L. – **CB DT M NE VM** – annual, cyathium glands greenish yellow.**1b:** 0037 [7]; **6c:** 0225 [11]; **11:** 0386 [10]; **17:** 0652 [11]; **20:** 0882 [9]; **28:** 1079 [3].**Euphorbia peplus** L. – **CB NE** – annual.**6c:** 0222 [10]; **17:** 0667 [15].**Euphorbia peplus** var. **minima** DC. – **CB DT** – annual.**8:** 0290 [2]; **16:** 0611 [1].**Euphorbia terracina** L. – **CB NE** – annual, biennial or perennial.**7:** 0272 [12]; **11:** 0406 [11]; **25:** 0986 [10].**Fagaceae****Quercus canariensis** Willd. – **K** – semideciduous tree 10-20 m.**34:** 1205 [16] (old fruits); **36:** 1255 [12]; **41:** 1336 [13].**Quercus coccifera** L. – **CB DT M NE** – shrub or tree, 0.8-5 m.**5:** 0201 [3]; **11d:** 0384 [9]; **12:** 0473 [11]; **18:** 0777 [10]; **21:** 0926 [11]; **25:** 0996 [12];**29c:** 1112 [11] (sterile).

*Quercus ilex* subsp. *ballota* (Desf.) Samp. – **CB DT** – tree, 4-10 m.

**8:** 0304 [11]; **12:** 0474 [13].

*Quercus ilex* subsp. *ballota* (Desf.) Samp. × *Q. coccifera* L. – **DT** – tree 4 m.

**12:** 0475 [8].

*Quercus suber* L. – **K M** – evergreen tree 2-20 m.

**21:** 0925 [11]; **34:** 1206 [9] (old fruits); **36:** 1256 [10]; **41:** 1335 [10].

### Frankeniaceae

*Frankenia hirsuta* L. – **CB** – prostrate perennial.

**6e:** 0250 [3].

*Frankenia laevis* L. – **CB NE**.

**4:** 0123 [6]; **17c:** 0708 [8] (sterile).

*Frankenia pulverulenta* L. – **CB** – annual, flowers white.

**4:** 0131 [1]; **6e:** 0251 [1].

### Gentianaceae

*Blackstonia perfoliata* (L.) Huds. – **K** – flowers yellow.

**39:** 1312 [4].

### Geraniaceae

*Erodium botrys* (Cav.) Bertol. – **CB** – annual.

**8:** 0327 [1].

*Erodium cicutarium* (L.) L'Hér. – **CB K** – annual, flowers pale lilac to purplish pink.

**8:** 0326 [12]; **30:** 1132 [5]; **39:** 1318 [7].

*Erodium laciniatum* (Cav.) Willd. – **CB NE** – annual, flowers purplish pink.

**5:** 0188 [13]; **18e:** 0770 [9].

*Erodium malacoides* (L.) L'Hér. – **CB DT** – annual, flowers purplish pink.

**2:** 0079 [8]; **11:** 0420 [1]; **12:** 0491 [9]; **16:** 0598 [10].

*Erodium moschatum* (L.) L'Hér. – **CB DT K** – annual, flowers pink to violet.

**2:** 0080 [7]; **5:** 0182 [7]; **38:** 1305 [15].

*Geranium lucidum* L. – **NE** – annual, flowers purplish pink.

**17e:** 0710 [10].

*Geranium molle* L. – **CB K** – annual, flowers purplish pink.

**7:** 0283 [3]; **8:** 0306 [14]; **11k:** 0418 [6]; **34:** 1215 [7]; **36:** 1258 [8]; **39:** 1323 [10].

*Geranium purpureum* Vill. – **NE** – annual, flowers deep purplish pink.

**17:** 0709 [10]; **25:** 0975 [10].

*Geranium robertianum* L. – **M** – annual, flowers pink.

**19:** 0839 [10].

### Globulariaceae

*Globularia alypum* L. – **DT** – shrub 40 cm, flowers blue.

**12:** 0478 [10].

### Guttiferae

*Hypericum afrum* Lam. – **K** – semi-shrub 1 m.

**41:** 1340 [11].



*Hypericum australe* Ten. – **CB K M** – ascending perennial or suffrutex, flowers yellow, reddish outside.

**5:** 0212 [2]; **21:** 0932 [5]; **29:** 1097 [2]; **30:** 1131 [7]; **31:** 1159 [3].

### *Labiatae*

*Lamium amplexicaule* L. – **K** – annual.

**37:** 1279 [6].

*Lavandula multifida* L. – **DT** – suffrutex 30 cm, flowers bluish violet.

**15:** 0525 [15]; **16:** 0572 [10].

*Lavandula stoechas* L. – **CB M** – shrub 40-80 cm, flowers blackish violet, as also the sterile bracts – **5:** 0168 [6]; **19:** 0817 [12]; **21:** 0921 [7]; **29:** 1099 [11].

*Prasium majus* L. – **CB DT NE** – shrub 1 m, flowers white.

**11:** 0407 [10]; **16:** 0586 [9]; **17:** 0674 [4].

*Rosmarinus officinalis* L. – **CB DT** – shrub 0.4-1 m, flowers blue or bluish violet.

**1:** 0048 [8]; **10:** 0339 [10]; **12:** 0476 [9].

*Salvia microphylla* Kunth – **K** – Cultivated.

**35:** 1230 [5].

*Salvia verbenaca* L. – **CB DT NE VM** – biennial, flowers pale to dark blue violet (lower lip sometimes white), plant fetid.

**1:** 0030 [8]; **5:** 0159 [13]; **12:** 0462 [10]; **18e:** 0757 [6]; **25:** 0971 [7]; **28:** 1080 [8].

*Salvia viridis* L. – **DT** – annual, flowers pink.

**16:** 0559 [15].

*Satureja nervosa* Desf. – **CB DT** – suffrutex, flowers pale to dark lilac or lavender.

**3:** 0091 [10]; **11i:** 0417 [4]; **16:** 0560 [8].

*Stachys arenaria* Vahl – **CB**.

**5:** 0183 [2] (sterile).

*Stachys arvensis* (L.) L. – **CB M** – annual, flowers pale bluish or purplish pink.

**8:** 0307 [1]; **19:** 0809 [13].

*Stachys marrubifolia* Viv. – **M** – annual, flowers purplish pink.

**29:** 1100 [10].

*Stachys ocymastrum* (L.) Briq. – **DT** – annual, corolla white with pale yellow, purple-dotted lower lip and white, laterally purple-marked upper lip with linear lobes.

**12:** 0484 [2]; **16:** 0587 [10].

*Teucrium fruticans* L. – **M** – shrub 40 cm, flowers pale blue with dark veins.

**19:** 0875 [2]; **21:** 0920 [10].

*Thymus algeriensis* Boiss. & Reut. – **DT** – shrublet 20 cm, flowers purplish pink.

**1:** 0020 [6]; **12:** 0479 [11]; **16:** 0588 [10].

*Thymus numidicus* Poir. – **K** – shrublet 20 cm.

**30:** 1127 [6] (sterile).

### *Leguminosae*

*Acacia cyclops* G. Don f. – **NE** – shrub 2 m, cultivated and escaping.

**26b:** 1011 [9].

*Acacia saligna* (Labill.) Wendl. f. – **CB NE** – naturalised tree c. 8 m, flowers yellow.

**11d:** 0409 [12]; **25:** 0994 [10].

- Anthyllis barba-jovis* L. – **M** – shrub 2.5 m, flowers whitish yellow.  
**29b**: 1092 [10].
- Anthyllis vulneraria* subsp. *maura* (Beck) Maire – **DT NE** – biennial or perennial, flowers white to pink with pink or dark purple keel, calyx purplish distally.  
**1**: 0049 [10]; **12**: 0439 [14]; **25**: 0963 [16].
- Astragalus caprinus* L. – **DT** – flowers yellowish green.  
**1**: 0043 [8].
- Astragalus epiglottis* L. – **NE** – annual, flowers bluish .  
**17**: 0650 [4].
- Astragalus falciformis* Desf. – **DT** – flowers bluish.  
**1**: 0072 [13].
- Astragalus hamosus* L. – **NE** – decumbent annual, standard bluish, wings and keel whitish.  
**17**: 0646 [4].
- Astragalus longicaulis* Pomel – **DT** – decumbent annual, flowers pale blue.  
**13**: 0504 [3].
- Astragalus sesameus* L. – **NE** – annual, flowers blue.  
**17**: 0648 [1].
- Calicotome infesta* subsp. *intermedia* (C. Presl) Greuter – **CB DT** – spiny shrub 0.7-2 m, flowers yellow.  
**1**: 0031 [6]; **5**: 0149 [9]; **10**: 0341 [11]; **11d**: 0412 [9]; **12**: 0441 [9]; **15**: 0526 [10]; **16**: 0633 [7].
- Calicotome villosa* (Poir.) Link – **M NE VM** – spiny shrub 1.5-1.8 m, flowers yellow.  
**18e**: 0763 [7]; **19**: 0830 [9]; **21**: 0937 [7]; **28**: 1047 [7]; **29**: 1120 [7].
- Ceratonia siliqua* L. – **DT** – tree 15 m.  
**12**: 0457 [10].
- Coronilla juncea* L. – **DT M** – straggling shrub 1.7 m, flowers yellow.  
**1**: 0007 [4], 0067 [10]; **21**: 0944 [3].
- Coronilla scorpioides* (L.) W. D. J. Koch – **DT NE** – annual, flowers yellow.  
**1**: 0074 [3]; **17**: 0643 [10].
- Coronilla valentina* L. subsp. *valentina* – **NE** – shrub 80 cm, flowers yellow.  
**17**: 0638 [7].
- Cytisus villosus* Pourr. – **K** – shrub 1-2 m, flowers yellow.  
**34**: 1224 [13]; **37**: 1284 [9]; **39**: 1313 [7].
- Genista aspalathoides* Lam. – **CB DT M** – spiny cushion 20 cm or shrub 0.4-1.5 m, flowers yellow.  
**1**: 0058 [10]; **5**: 0151 [3]; **5**: 0152 [10]; **8**: 0303 [10]; **10**: 0343 [10]; **29c**: 1121 [12].
- Genista ferox* Poir. – **M VM** – spiny shrub 1-2 m, flowers yellow.  
**20**: 0903 [13]; **28**: 1052 [6] (in fruit); **29d**: 1111 [12] (in fruit).
- Genista tricuspidata* Desf. – **DT** – shrub 40 cm, flowers yellow.  
**1**: 0071 [4]; **2**: 0083 [7].
- Genista ulicina* Spach – **K M** – straggling shrub 1-1.5 m, flowers yellow.  
**19**: 0853 [1]; **21**: 0943 [2]; **37**: 1283 [10] (sterile).
- Hedysarum coronarium* L. – **NE VM** – perennial, flowers reddish purple.  
**18d**: 0766 [5] (in bud); **28**: 1048 [14].

- Hedysarum spinosissimum* subsp. *capitatum* (Rouy) Asch. & Graebn. – **CB DT VM** – annual (perennial?), flowers pink to purple.  
**1:** 0073 [7]; **11c:** 0373 [20]; **28:** 1042 [11].
- Hippocrepis biflora* Spreng. – **DT NE** – annual, flowers yellow.  
**1b:** 0018 [3]; **17:** 0653 [6].
- Hippocrepis brevipetala* (Murb.) E. Domínguez – **NE VM** – annual (perennial?), flowers yellow, very fragrant.  
**17:** 0655 [2]; **28:** 1046 [18].
- Hippocrepis ciliata* Willd. – **CB DT** – annual, flowers yellow.  
**1b:** 0022 [6]; **11:** 0411 [5].
- Hippocrepis emerus* subsp. *emeroides* (Boiss. & Sprun.) Lassen – **DT** – shrub 1.5 m, flowers yellow.  
**1:** 0005 [15].
- Hymenocarpus circinnatus* (L.) Savi – **DT** – annual, flowers yellow.  
**15:** 0542 [3].
- Lathyrus cicera* L. – **DT** – annual, flowers dark purple.  
**16:** 0626 [3].
- Lathyrus clymenum* L. – **DT** – annual, standard purple, wings and keel bluish violet.  
**1:** 0070 [7]; **16:** 0625 [9].
- Lathyrus ochrus* (L.) DC. – **CB** – annual, flowers pale yellow.  
**11j:** 0387 [12].
- Lens nigricans* (M. Bieb.) Godr. – **NE** – annual, flowers pale blue.  
**17:** 0668 [13].
- Lotus biflorus* Desr. – **DT** – annual, flowers yellow.  
**16:** 0613 [10].
- Lotus cytisoides* L. – **CB DT K M NE** – perennial, flowers yellow.  
**2:** 0087 [10]; **5:** 0173 [11]; **8:** 0302 [18]; **10:** 0336 [15]; **11:** 0413 [10]; **12:** 0442 [12];  
**15:** 0540 [13]; **25:** 0960 [15]; **29:** 1122 [14]; **32:** 1166 [11]; **36:** 1235 [11].
- Lotus cytisoides* subsp. *conradiae* Gamisans – **CB NE** – perennial, flowers yellow.  
**6:** 0227 [14]; **18:** 0768 [10]; **26:** 1002 [12].
- Lotus edulis* L. – **CB DT M NE** – annual, flowers yellow, standard with purple veins.  
**1b:** 0002 [11]; **2:** 0086 [4]; **11:** 0361 [12]; **12:** 0455 [10]; **15:** 0543 [4]; **16:** 0617 [10];  
**17:** 0642 [12]; **18e:** 0771 [10]; **19:** 0834 [5].
- Lotus ornithopodioides* L. – **CB DT M NE** – annual, flowers yellow.  
**1b:** 0024 [7]; **2:** 0088 [10]; **11:** 0403 [9]; **12:** 0456 [10]; **16:** 0615 [10]; **17:** 0637 [6];  
**19:** 0835 [8].
- Lotus tetragonolobus* L. – **CB DT M VM** – annual, flowers dark purple.  
**11c:** 0379 [12]; **16:** 0624 [3]; **20:** 0901 [5]; **28:** 1043 [4].
- Lupinus cosentinii* Guss. – **NE** – annual, standard and wings blue, standard with twin whitish macula, keel whitish with dark violet tip.  
**25:** 0957 [9].
- Medicago littoralis* Loisel. – **CB DT K NE** – decumbent annual, flowers yellow.  
**11:** 0415 [10]; **13:** 0503 [11]; **15:** 0544 [3]; **18:** 0769 [10]; **32:** 1168 [5].
- Medicago lupulina* L. – **NE** – annual, flowers yellow, fruit pubescent.  
**17:** 0658 [10].

- Medicago marina* L. – **CB** – perennial, flowers yellow.  
6: 0232 [14].
- Medicago minima* (L.) L. – **DT** – annual, flowers yellow.  
15: 0548 [10].
- Medicago monspeliaca* (L.) Trautv. – **NE** – annual, flowers yellow.  
17: 0660 [14].
- Medicago polymorpha* L. – **NE** – annual, flowers yellow.  
17: 0636 [2]; 17: 0651 [7].
- Medicago soleirolii* Duby – **CB** – annual, flowers yellow.  
5: 0166 [2].
- Melilotus messanensis* (L.) All. – **CB** – annual 30 cm, flowers yellow.  
4: 0106 [11]; 7: 0267 [3].
- Melilotus sulcatus* Desf. – **CB DT** – annual, flowers yellow.  
4: 0107 [12]; 11j: 0388 [4]; 16: 0623 [10].
- Ononis alba* Poir. subsp. *alba* – **DT** – annual, flowers light pink.  
16: 0627 [3].
- Ononis hispanica* subsp. *ramosissima* (Desf.) Förther & Podl. – **CB** – suffrutex 50 cm, flowers yellow with red stripes.  
10: 0346 [12].
- Ononis variegata* L. – **CB NE** – perennial, flowers yellow, standard with reddish veins.  
6: 0226 [12]; 18: 0767 [12].
- Parkinsonia aculeata* L. – **K** – invasive naturalised alien shrub 2 m.  
33: 1195 [7] (sterile).
- Retama raetam* (Forssk.) Webb – **CB NE** – retamoid shrub 1-1.5 m, flowers white.  
6: 0219 [10]; 25: 0958 [15].
- Scorpiurus muricatus* L. – **CB DT** – annual, flowers yellow suffused orange, standard purple-veined.  
2: 0084 [4]; 11j: 0389 [12]; 16: 0622 [10].
- Trifolium campestre* Schreb. – **M NE** – annual, flowers pale yellow.  
17: 0662 [1]; 21: 0936 [5].
- Trifolium nigrescens* Viv. – **CB DT K NE** – annual (perennial?), flowers whitish to pale pink.  
4: 0109 [11]; 15: 0547 [4]; 17: 0645 [2]; 32: 1167 [1].
- Trifolium scabrum* L. – **CB DT K NE** – annual, flowers pale pink to whitish.  
4: 0116 [6]; 15: 0545 [3]; 17: 0656 [16]; 32: 1169 [4].
- Trifolium stellatum* L. – **CB DT NE** – annual, flowers white turning pale pink.  
2: 0085 [6]; 11: 0397 [12]; 15: 0546 [5]; 17: 0647 [10].
- Trifolium subterraneum* L. – **CB M K** – annual, flowers white.  
5: 0170 [10]; 19: 0833 [12]; 36: 1242 [5].
- Trifolium suffocatum* L. – **CB K** – annual (perennial?), flowers whitish.  
5: 0167 [3]; 36: 1243 [7].
- Trifolium tomentosum* L. – **CB K NE** – annual, flowers pink.  
4: 0117 [4]; 17: 0664 [15]; 38: 1295 [14].
- Trigonella foenum-graecum* L. – **CB M VM** – annual, flowers whitish, plant aromatic; also cultivated.  
11: 0422 [2]; 20: 0902 [10]; 28: 1041 [10].

*Tripodion tetraphyllum* (L.) Fourr. – **CB DT NE** – annual, standard cream, wings yellow, keel yellow or dark purple tipped.

**11:** 0370 [4]; **16:** 0614 [16]; **17:** 0666 [13].

*Vicia leucantha* Biv. – **CB** – annual, flowers whitish.

**11j:** 0372 [12].

*Vicia sativa* L. – **CB** – annual, flowers purple, standard paler.

**11j:** 0414 [14].

*Vicia sativa* subsp. *nigra* (L.) Ehrh. – **CB NE** – annual, 30 cm, flowers purplish violet, standard sometimes bluish.

**7:** 0266 [3]; **25:** 0962 [3].

*Vicia villosa* Roth subsp. *varia* (Host) Corb. – **NE** – annual, standard, wing claw and keel blue, wings distally white, keel with twin round white subapical macula.

**25:** 0961 [12].

### *Linaceae*

*Linum bienne* Mill. – **CB DT K M** – annual, flowers blue.

**3:** 0089 [6]; **5:** 0200 [4]; **19:** 0821 [11]; **31:** 1157 [7].

*Linum decumbens* Desf. – **DT** – annual, flowers burgundy.

**16:** 0602 [12].

*Linum trigynum* L. – **DT** – annual, flowers sulphur yellow.

**16:** 0608 [6].

### *Malvaceae*

*Malope malacoides* subsp. *tripartita* (Boiss. & Reut.) Maire – **VM** – perennial, flowers purplish pink with dark veins.

**28d:** 1067 [12].

*Malva olbia* (L.) Alef. – **M** – shrub 3.5 m, flowers purple.

**21:** 0941 [5].

*Malva parviflora* L. – **DT K** – annual, flowers pink.

**2:** 0082 [9]; **38:** 1293 [11].

*Malva sylvestris* L. – **DT** – perennial, flowers purplish pink with darker veins.

**2:** 0077 [6]; **16:** 0591 [10].

### *Moraceae*

*Ficus infectoria* Roxb. – **NE** – tree 10 m, planted.

**26bis:** 1015 [10].

### *Myoporaceae*

*Myoporum tenuifolium* G. Forst. – **K** – shrub, 2 m, flowers white.

**38:** 1306 [9].

### *Myrtaceae*

*Eucalyptus gomphocephala* DC. – **M** – tree 10 m.

**19:** 0820 [14].

*Myrtus communis* L. – **K** – shrub 2 m.

**43:** 1363 [11].

### *Oleaceae*

*Fraxinus angustifolia* subsp. *oxycarpa* (Willd.) Franco & Rocha Afonso – **K** – tree over 4 m.

**32:** 1177 [6] (in fruit).

*Jasminum fruticans* L. – **DT NE** – shrub 0.7-1 m, flowers yellow.

**12:** 0493 [7]; **16:** 0620 [10]; **17:** 0663 [10].

*Phillyrea latifolia* L. – **CB DT K M** – shrub 1-3 m, flowers pale yellow.

**5:** 0136 [10]; **12:** 0480 [10]; **16:** 0575 [10]; **19:** 0826 [10]; **36:** 1237 [15].

### *Orobanchaceae*

*Orobanche crenata* Forssk. – **CB** – annual, stigma yellow.

**11j:** 0400 [1].

*Orobanche minor* Sm. – **M**.

**23:** 0948 [4] (on *Galactites tomentosus*).

*Orobanche mutelii* F. W. Schultz – **NE** – annual, flowers pale lilac, stigma white.

**17:** 0746 [1] (on *Hyoseris radiata*).

*Orobanche nana* (Reut.) G. Beck – **NE** – annual, flowers pale bluish violet to lilac or purple, stigma white.

**25:** 0967 [10] (on *Oxalis pes-caprae*); **25:** 0968 [4] (on *Medicago littoralis*); **26:** 1008 [4] (on *Oxalis pes-caprae*).

*Orobanche schultzei* Mutel – **NE** – annual.

**18:** 0801 [1] (on *Asteraceae* sp.; in bud).

*Orobanche variegata* Wallr. – **DT M VM** – annual, flowers dark dirty blood-red distally, pale proximally, stigma yellow.

**1:** 0023 [2] (on *Calycotome villosa*); **5:** 0153 [2] (on *Calycotome villosa*); **19:** 0865 [2]; **28:** 1040 [7].

### *Oxalidaceae*

*Oxalis pes-caprae* L. – **DT** – geophyte, flowers yellow.

**16:** 0619 [10].

### *Papaveraceae*

*Fumaria bastardii* Bor. – **CB** – annual, flowers purple with dark tip.

**6c:** 0245 [10].

*Fumaria bicolor* Sommier – **CB M NE** – annual, flowers whitish to pale pink with dark purple tip.

**5:** 0210 [1]; **8:** 0294 [1]; **17:** 0736 [8]; **18:** 0784 [11]; **25:** 0989 [8]; **29:** 1115 [12].

*Fumaria capreolata* L. – **K M** – annual, flowers white with blackish purple tip.

**19:** 0842 [2]; **36:** 1265 [3].

*Papaver dubium* L. – **NE** – annual, petals brick red, unspotted.

**17:** 0733 [1].

*Papaver hybridum* L. – **NE** – annual, petals blood-red with black basal spot.

**17:** 0730 [10].

*Papaver rhoeas* L. – **K** – annual, flowers flame red, lacking dark spots.

**31:** 1153 [1].

### *Plantaginaceae*

*Plantago afra* L. – **CB DT NE VM** – annual.

**11:** 0398 [13]; **15:** 0532 [4]; **16:** 0577 [10]; **17:** 0683 [6]; **18c:** 0759 [14]; **25:** 0980 [9];

**28:** 1081 [8].

*Plantago albicans* L. – **CB NE** – perennial.

**11c:** 0390 [10]; **25:** 0988 [10].

*Plantago coronopus* L. – **CB**.

– 0104 [12].

*Plantago crassifolia* Forssk. – **CB M NE** – perennial.

**6:** 0231 [13]; **18:** 0760 [10]; **29:** 1098 [3].

*Plantago lagopus* L. – **CB DT** – annual.

**1:** 0056 [10]; **6c:** 0229 [12].

*Plantago weldenii* Rchb. – **CB**.

**4:** 0102 [6]; **4:** 0103 [6].

### *Plumbaginaceae*

*Limonium hipponense* Brullo & Erben – **NE**.

**18d:** 0805 [5] (sterile).

*Limonium zembrae* Pignatti – **CB** – perennial.

**10:** 0348 [1] (sterile).

### *Polygalaceae*

*Polygala monspeliaca* L. – **M** – annual, flowers greenish with dirty purple veins.

**19:** 0872 [10].

*Polygala numidica* Pomel – **K M** – perennial, flowers green becoming pale to purplish blue turning green again, crest whitish.

**19:** 0840 [4]; **29c:** 1107 [4]; **30:** 1126 [9]; **31:** 1161 [5].

### *Polygonaceae*

*Polygonum aviculare* L. – **K** – annual, flowers whitish to pink.

**31:** 1163 [1]; **38:** 1300 [6].

*Polygonum maritimum* L. – **M NE** – perennial, tepals white, outside with greenish stripe.

**21b:** 0931 [5]; **26:** 1007 [6].

*Rumex bucephalophorus* L. – **CB** – annual – **5:** 0191 [10] (sterile).

*Rumex bucephalophorus* L. subsp. *bucephalophorus* – **CB NE** – annual.

**6b:** 0255 [12]; **25:** 0973 [7].

*Rumex bucephalophorus* subsp. *gallicus* (Steinh.) Rech. f. – **DT NE** – annual.

**16:** 0599 [14]; **18:** 0787 [11].

*Rumex roseus* L. – **NE** – perennial.

**26:** 1010 [11].



**Primulaceae**

*Anagallis arvensis* L. – **CB DT NE** – annual, flowers deep blue with purple tube.

**1:** 0053 [5]; **5:** 0189 [5]; **6c:** 0236 [10]; **16:** 0585 [10]; **17:** 0673 [7].

*Anagallis monelli* L. – **CB VM** – perennial, flowers deep blue with purple eye and tube.

**5:** 0206 [3]; **10:** 0354 [10]; **28:** 1072 [8].

*Asterolinon linum-stellatum* (L.) Duby – **DT** – annual.

**16:** 0616 [10].

**Ranunculaceae**

*Adonis microcarpa* DC. – **VM** – annual, flowers flame red with black eye and stamens.

**28:** 1054 [16].

*Clematis cirrhosa* L. – **M NE** – woody climber.

**17:** 0749 [8] (sterile); **19:** 0818 [5] (sterile young shoots).

*Clematis flammula* L. – **M** – woody climber.

**19:** 0815 [10] (sterile).

*Nigella damascena* L. – **DT** – annual, sepals whitish with greenish-blue veins, honey-leaves blackish blue.

**16:** 0576 [3].

*Ranunculus aquatilis* L. – **K M** – most leaves floating, flowers white.

**20:** 0892 [1]; **43b:** 1367 [10].

*Ranunculus arvensis* L. – **VM** – annual, flowers yellow.

**28:** 1051 [11].

*Ranunculus bullatus* L. – **NE** – geophyte.

**17:** 0739 [9] (sterile).

*Ranunculus ficaria* subsp. *ficariiformis* Rouy & Fouc. – **K M VM** – perennial, petals bright yellow, greenish or purplish green outside.

**19:** 0827 [10]; **28:** 1061 [6]; **34:** 1220 [10].

*Ranunculus macrophyllus* Desf. – **VM** – geophyte, flowers yellow.

**28:** 1053 [10].

*Ranunculus millefoliatus* Vahl – **DT** – geophyte, flowers yellow.

**12:** 0454 [14].

*Ranunculus muricatus* L. – **M NE** – annual, flowers yellow.

**17:** 0737 [10]; **17:** 0743 [7]; **19:** 0831 [10]; **21:** 0919 [7]; **29:** 1114 [15].

*Ranunculus ophioglossifolius* Vill. – **K** – perennial, flowers yellow.

**32:** 1180 [2].

*Ranunculus paludosus* Poir. – **CB M** – geophyte, flowers bright yellow.

**5:** 0199 [6]; **8:** 0328 [10]; **19:** 0824 [10]; **21:** 0918 [13].

*Ranunculus peltatus* Schrank – **M** – floating leaves present, petals white with yellow claw.

**20:** 0890 [11].

*Ranunculus spicatus* subsp. *blephariocarpos* (Boiss.) Grau – **DT K M NE** – geophyte, flowers yellow.

**12:** 0453 [6]; **17:** 0740 [12]; **19:** 0829 [3]; **34:** 1225 [4].

*Ranunculus trichophyllus* Chaix – **K M** – annual, all leaves submersed, flowers white, very small.

**20:** 0891 [12]; **32:** 1183 [8].

*Resedaceae*

*Reseda alba* L. – **CB DT NE** – annual or biennial, flowers white.

**11:** 0410 [9]; **16:** 0628 [7]; **25:** 0998 [11].

*Reseda lutea* L. – **DT** – perennial, flowers pale yellow.

**13b:** 0499 [2].

*Rhamnaceae*

*Rhamnus alaternus* L. – **CB K** – shrub 2-5 m, flowers yellowish green.

**11d:** 0382 [7]; **34:** 1197 [15]; **43:** 1362 [5].

*Rhamnus lycioides* subsp. *oleoides* (L.) Jahand. & Maire – **CB NE VM** – shrub 0.3-1.5 m.

**11d:** 0383 [13]; **17:** 0731 [5] (in bud); **28:** 1088 [4] (in bud).

*Rhamnus myrtifolius* Willk. – **DT** – decumbent shrub ca. 10 cm.

**16b:** 0603 [2].

*Rosaceae*

*Aphanes floribunda* (Murb.) Rothm. – **K** – annual.

**36:** 1271 [3].

*Crataegus azarolus* L. – **DT VM** – shrub or tree, 3-5 m, flowers white, styles 2-3.

**13:** 0502 [8]; **28:** 1044 [10].

*Crataegus monogyna* Jacq. – **K VM** – shrub 1-2.5 m, flowers white, style 1.

**28:** 1045 [7]; **37:** 1285 [8].

*Prunus avium* L. – **K** – tree 4 m.

**42:** 1349 [3]; **43:** 1368 [7].

*Prunus prostrata* Labill. – **DT** – small, erect shrub, flowers pink.

**12:** 0440 [8].

*Rubus incanescens* (DC.) Bertol. – **K**.

**42:** 1355 [7] (sterile); **43:** 1369 [7] (sterile).

*Rubus ulmifolius* Schott – **CB K M NE** – sometimes climbing in trees to at least 5 m, flowers white.

**11d:** 0404 [9] (sterile); **11f:** 0408 [6]; **19:** 0864 [10] (sterile); **25:** 0969 [10]; **34:** 1204 [12] (with *Smilax*, old fruits).

*Rubiaceae*

*Crucianella maritima* L. – **NE** – suffrutex, sterile.

**18:** 0782 [6].

*Galium murale* (L.) All. – **M** – annual.

**19:** 0849 [3].

*Galium verrucosum* Huds. – **CB DT K VM** – annual, flowers white to pale yellow, fruit whitish, verrucose.

**8:** 0310 [12]; **12:** 0482 [12]; **16:** 0583 [16]; **28f:** 1078 [10]; **36:** 1268 [15].

*Rubia peregrina* L. – **CB DT** – straggling perennial, flowers white to greenish white.

**11d:** 0416 [11]; **16:** 0573 [8].

*Sherardia arvensis* L. – **CB DT K M** – annual, flowers pink to reddish violet.

**1:** 0046 [6]; **5:** 0171 [6]; **15:** 0527 [10]; **16:** 0584 [12]; **20:** 0880 [15]; **36:** 1248 [3].

*Valantia muralis* L. – **CB NE** – annual.

**7:** 0271 [5]; **8:** 0308 [15]; **17:** 0659 [11]; **17:** 0734 [1]; **18d:** 0772 [10].

### *Salicaceae*

*Populus alba* L. – **K** – tree 3 m.

**36:** 1270 [4].

*Salix atrocinerea* Brot. – **K** – shrub or tree to 5 m.

**32:** 1170 [8] (sterile); **32:** 1174 [9]; **39:** 1311 [13].

### *Saxifragaceae*

*Saxifraga tridactylites* L. – **NE** – annual, flowers white.

**17:** 0703 [2].

### *Scrophulariaceae*

*Antirrhinum majus* subsp. *tortuosum* (Lam.) Ball – **DT** – perennial, flowers purple with yellow marks in throat.

**16:** 0574 [10].

*Cymbalaria muralis* P. Gaertn. & al. – **M**.

**22:** 0947 [11].

*Linaria cossonii* Bonnet & Barratte – **NE** – biennial?, flowers purple.

**25:** 0993 [6].

*Linaria doumetii* Bonnet & Barratte – **DT** – annual, flowers white with yellow throat and violet veins.

**12:** 0485 [5].

*Linaria multicaulis* subsp. *heterophylla* (Desf.) D. A. Sutton – **CB** – annual, flowers yellow.

**7:** 0268 [6].

*Linaria reflexa* (L.) Desf. – **CB DT K M NE VM** – annual, flowers white or pale blue to bright violet with orange-yellow throat marks .

**5:** 0165 [5]; **8:** 0312 [3]; **11:** 0392 [5]; **15:** 0531 [5]; **18e:** 0761 [8]; **20:** 0881 [4]; **28:** 1069 [9]; **37:** 1286 [8].

*Linaria triphylla* (L.) Mill. – **DT M VM** – annual, flowers pale yellow, lower lip yolk yellow, spur violet.

**15:** 0530 [2]; **20:** 0883 [1]; **28:** 1077 [16].

*Misopates orontium* (L.) Raf. – **DT** – annual, flowers pale purplish pink.

**16:** 0609 [10].

*Odontites squarrosus* (Rchb.) Bolliger – **DT** – semishrub, flowers dark red.

**1:** 0009 [8].

*Parentucellia latifolia* (L.) Caruel – **DT VM** – annual, corolla limb whitish, tube and sometimes upper lip dark purple.

**12:** 0459 [6]; **28:** 1074 [5].

*Scrophularia canina* L. – **DT** – perennial 1 m, flowers blackish purple with white lower lip.

**16:** 0554 [10].

*Scrophularia laevigata* Vahl – **NE** – perennial, flowers dirty red.

**17e:** 0693 [10].

*Scrophularia peregrina* L. – NE – annual, flowers blackish purple.

17: 0692 [7].

*Scrophularia tenuipes* Coss. & Durieu – K – perennial.

4d: 1196 [2] (sterile).

*Verbascum creticum* (L.) Kuntze – DT M VM – biennial, flowers yellow, filament wool and marks on two upper corolla lobes dark purple.

13: 0501 [3]; 20: 0879 [9]; 28: 1084 [3].

*Veronica arvensis* L. – K M NE – annual, flowers blue.

17: 0681 [14]; 19: 0814 [5]; 36: 1231 [10]; 38: 1294 [12].

*Veronica cymbalaria* Bodard – K NE – annual, flowers white, often small.

17: 0657 [8]; 26c: 1013 [12]; 32: 1164 [9]; 34: 1200 [7]; 36: 1247 [14].

*Veronica polita* Fr. – NE – annual.

17: 0657a [2].

### *Solanaceae*

*Datura metel* L. – M – perennial.

21c: 0930 [4] (old fruits).

*Hyoscyamus albus* L. – NE – annual, flowers pale yellow throughout.

17f: 0649 [10].

*Lycium europaeum* L. – CB – shrub, fruit red.

6c: 0239 [10].

### *Tamaricaceae*

*Tamarix africana* Poir. – CB K M NE – shrub or small tree 2-4 m, flowers whitish.

11f: 0399 [11]; 17c: 0701 [11]; 20: 0908 [10]; 32: 1176 [7].

### *Theligonaceae*

*Theligonum cynocrambe* L. – DT K M NE – annual.

16: 0556 [10]; 17: 0726 [5]; 19: 0812 [12]; 34: 1223 [4].

### *Thymelaeaceae*

*Thymelaea argentata* (Lam.) Pau – DT – shrub 0.8 m.

1: 0012 [5].

*Thymelaea hirsuta* (L.) Endl. – CB M – fetid shrub 0.5-1.5 m, flowers pale yellow.

7: 0277 [10]; 10: 0355 [11]; 10: 0356 [13]; 19: 0816 [12].

### *Ulmaceae*

*Ulmus minor* subsp. *canescens* (Melville) Browicz & Ziel. – K – tree 7 m.

32: 1229 [9] (sterile).

### *Umbelliferae*

*Daucus carota* subsp. *fontanesii* Thell. – CB – decumbent perennial, flowers pale pink, central flower dark purple.

10: 0357 [10].

*Ferula communis* L. – NE – perennial, flowers yellow.

17: 0694 [11].

*Helosciadium nodiflorum* (L.) W. D. J. Koch – K – perennial.

4: 1201 [7] (sterile).

*Kundmannia sicula* (L.) DC. – VM – perennial.

28: 1057 [7] (in bud).

*Sanicula europaea* L. – K – perennial, flowers white.

39: 1317 [17].

*Scandix pecten-veneris* L. – CB DT VM – annual, flowers white.

11j: 0395 [5]; 16: 0557 [10]; 28f: 1073 [7].

*Smyrniolum olusatrum* L. – CB VM – perennial, flowers pale greenish yellow.

11h: 0396 [18]; 28: 1082 [10].

*Thapsia garganica* L. – VM – perennial, flowers yellow.

28: 1087 [14].

### *Urticaceae*

*Parietaria judaica* L. – CB – perennial.

8e: 0331 [2].

*Parietaria lusitanica* L. – DT NE – annual.

16: 0555 [1]; 17: 0689 [18].

*Urtica membranacea* Poir. – CB NE – annual – 6c: 0233 [8]; 7: 0280 [10]; 7: 0282 [12];

8b: 0318 [10]; 25: 0972 [8].

*Urtica pilulifera* L. – DT NE – annual.

5: 0537 [10]; 17: 0661 [8].

*Urtica urens* L. – K – annual.

38: 1309 [11].

### *Valerianaceae*

*Centranthus calcitrapae* (L.) Dufur. – DT NE – annual, flowers pale pink.

16: 0553 [5]; 25: 0977 [12].

*Centranthus ruber* (L.) DC. – DT – perennial, flowers dark purplish pink.

16: 0563 [7].

*Fedia graciliflora* (L.) Fisch. & C. A. Mey. – CB DT K M NE VM – annual, flowers purplish pink to reddish violet.

5: 0172 [13]; 8: 0300 [16]; 11c: 0378 [10]; 12: 0481 [11]; 16: 0582 [10]; 17: 0654 [7];

17: 0682 [12]; 19: 0828 [11]; 28: 1075 [8]; 31: 1151 [6]; 36: 1249 [4]; 38: 1296 [16].

*Valeriana tuberosa* L. – DT – geophyte, flowers light pink.

12: 0460 [2].

*Valerianella carinata* Lois. – K – annual, flowers whitish.

36: 1244 [12].

*Valerianella discoidea* (L.) Lois. – DT – annual, flowers whitish.

15: 0529 [13].

*Valerianella microcarpa* Loisel. – K NE – annual, flowers pale pink.

17: 0672 [15]; 25: 0979 [12]; 32: 1165 [2].

**Verbenaceae**

*Citharexylum spinosum* L. – **NE** – tree 10 m, planted.

**26bis:** 1016 [9].

*Verbena officinalis* L. – **CB**.

**11e:** 0427 [10] (sterile).

**Violaceae**

*Viola riviniana* Rchb. – **K** – stoloniferous perennial, flowers violet with whitish centre, spur violet.

**34:** 1199 [11]; **39:** 1328 [7]; **42:** 1350 [1]; **43:** 1364 [7].

**MONOCOTYLEDONES****Alismataceae**

*Alisma lanceolatum* With. – **M** – perennial, flowers bluish pink.

**20:** 0877 [8].

**Amaryllidaceae**

*Narcissus tazetta* L. – **CB** – geophyte, flowers white with yellow paracorolla.

**11e:** 0401 [1].

**Araceae**

*Ambrosina bassii* L. – **CB** – geophyte.

**8:** 0297 [2].

*Arisarum vulgare* O. Targ. Tozz. – **DT K VM** – geophyte, spathe whitish green with purplish spots and stripes, spadix yellowish or purplish brown.

**15:** 0528 [1]; **28:** 1029 [8]; **38:** 1298 [2].

*Arum italicum* Mill. – **M VM** – geophyte, spathe pale greenish yellow, spadix yellow.

**20:** 0895 [1]; **21:** 0922 [10]; **28:** 1030 [7].

**Cyperaceae**

*Bolboschoenus maritimus* (L.) Palla – **K** – stoloniferous perennial.

**31:** 1145 [9].

*Carex cuprina* (Heuff.) A. Kern. – **K** – tufted.

**32:** 1178 [15].

*Carex depressa* Link – **K**.

**39:** 1320 [7]; **41:** 1344 [12]; **43b:** 1373 [9].

*Carex distachya* Desf. – **K M** – tufted perennial.

**19:** 0856 [10]; **34:** 1210 [10]; **36:** 1233 [7]; **39:** 1321 [6]; **43:** 1374 [4].

*Carex distans* L. – **K M NE** – tufted perennial.

**32:** 1181 [14].

*Carex divisa* Huds. — stoloniferous perennial.

**18f:** 0792 [10]; **29:** 1101 [4]; **31:** 1144 [8].

*Carex divulsa* Stokes – **K** – perennial.

**37:** 1273 [12].

- Carex flacca* subsp. *serrulata* (Spreng.) Greuter – **CB K M NE** – stoloniferous perennial.  
**5:** 0141 [12]; **10:** 0360 [1]; **18f:** 0791 [17]; **19:** 0855 [10]; **31:** 1146 [10]; **37:** 1278 [14];  
**41:** 1345 [1]; **42:** 1351 [8]; **42:** 1356 [8]; **43:** 1372 [8].
- Carex halleriana* Asso – **CB DT K M** – tufted perennial.  
**1:** 0065 [5]; **5:** 0142 [10]; **19:** 0856a [1]; **34:** 1211 [5]; **39:** 1320a [1].
- Carex pendula* Huds. – **K** – caespitose perennial.  
**32c:** 1172 [6]; **43:** 1371 [4].
- Carex remota* L. – **K M** – tufted perennial.  
**21:** 0942 [4]; **41b:** 1342 [6].
- Carex sylvatica* subsp. *pau* (Sennen) A. Bolòs & O. Bolòs – **K**.  
**39:** 1320b [4]; **41:** 1346 [4]; **43:** 1370 [8].
- Cyperus capitatus* Vand. – **NE** – stoloniferous perennial.  
**18:** 0776 [8]; **26:** 1005 [11].
- Cyperus involucratus* Rottb. – **CB** – perennial, naturalised.  
**11e:** 0402 [10].
- Cyperus longus* subsp. *badius* (Desf.) Asch. & Graebn. – **K** – perennial.  
**32:** 1175 [6].
- Eleocharis palustris* (L.) R. Br. – **K M** – tufted and stoloniferous perennial.  
**20:** 0907 [10]; **31:** 1142 [13]; **32:** 1179 [4].
- Isolepis cernua* (Vahl) Roem. & Schult. – **CB K M** – tufted annual.  
**5:** 0138 [12]; **8:** 0299 [6]; **19:** 0862 [13]; **32:** 1182 [2].
- Schoenus nigricans* L. – **CB** – tufted perennial.  
**5:** 0137 [10]; **6:** 0241 [13]; **10:** 0345 [15].
- Scirpoides holoschoenus* (L.) Soják – **CB NE VM** – tufted perennial, to 1 m.  
**11f:** 0377 [10]; **18f:** 0773 [7]; **28:** 1031 [5].

### *Dioscoreaceae*

- Dioscorea communis* (L.) Caddick & Wilkin – **CB DT M NE** – twining climber, flowers pale green to greenish yellow.  
**5:** 0157 [1]; **12:** 0463 [9] (in bud); **16:** 0621 [7]; **17:** 0751 [1]; **19:** 0841 [8]; **21:** 0923 [1] (sterile).

### *Gramineae*

- Aira caryophyllea* L. – **NE** – annual.  
**25:** 0981 [6].
- Aira cupaniana* Guss. – **M** – annual.  
**20:** 0887 [2]; **21:** 0929 [6].
- Alopecurus bulbosus* subsp. *macrostachyus* (Poir.) Trab. – **K M** – perennial.  
**20:** 0910 [10]; **31:** 1148 [1]; **32:** 1171 [8].
- Amphiphila arenaria* subsp. *arundinacea* H. Lindb. – **CB** – perennial.  
**6:** 0258 [4].
- Ampelodesmus mauritanicus* (Poir.) T. Durand & Schinz – **DT K M VM** – tufted perennial, to 1.5 m.  
**1:** 0059 [2]; **12:** 0443 [7]; **21:** 0928 [9]; **28:** 1038 [9]; **29:** 1091 [10]; **31:** 1141 [10].



- Anthoxanthum gracile* Biv. – **NE** – annual.  
17: 0748 [10].
- Anthoxanthum odoratum* L. – **CB** – perennial.  
8: 0295 [5].
- Aristida coerulescens* Desf. – **DT**. – tufted perennial.  
15: 0524 [1].
- Avena barbata* Link – **CB DT NE** – annual.  
6c: 0234 [5]; 7: 0269 [6]; 15: 0513 [5]; 16: 0580 [4]; 17: 0671 [6].
- Brachypodium retusum* (Pers.) P. Beauv. – **CB DT** – straggling perennial.  
1: 0061 [10]; 11c: 0380 [5].
- Bromus hordeaceus* L. – **DT NE** – annual.  
1: 0063 [5]; 25: 0990 [3]; 27: 1018 [3].
- Bromus madritensis* L. – **DT NE** – annual.  
1: 0066 [3]; 15: 0515 [2]; 16: 0567 [1]; 17: 0677 [10]; 25: 0982a [6].
- Bromus rigidus* Roth – **CB NE** – annual.  
6d: 0218 [10]; 11: 0365 [2]; 25: 0982 [4].
- Catapodium marinum* (L.) C. E. Hubb. – **CB**.  
4: 0133 [3].
- Catapodium rigidum* (L.) C. E. Hubb. – **NE** – annual.  
17: 0676 [6].
- Cynodon dactylon* (L.) Pers. – **DT** – prostrate perennial.  
15: 0514 [4].
- Dactylis glomerata* subsp. *hispanica* (Roth) Nyman – **DT** – tufted perennial.  
16: 0570 [4].
- Echinaria capitata* (L.) Desf. – **CB** – annual, 4 cm.  
5: 0169 [2].
- Festuca coerulescens* Desf. – **CB DT K M NE** – tufted perennial.  
5: 0207 [2]; 8: 0296 [1]; 12: 0444 [2]; 17: 0685 [4]; 19: 0837 [3]; 20: 0885 [1]; 36: 1239 [7]; 37: 1275 [11].
- Hordeum murinum* subsp. *leporinum* (L.) Arcang. – **CB DT NE** – annual.  
1: 0068 [1]; 6c: 0243 [4]; 11: 0366 [6]; 15: 0522 [2]; 17: 0669 [2].
- Hyparrhenia hirta* (L.) Stapf – **CB DT K** – tufted perennial.  
1: 0062 [4]; 3: 0096 [2]; 11: 0381 [10]; 31: 1139 [9].
- Lagurus ovatus* L. – **NE** – annual.  
25: 0983 [5].
- Lamarckia aurea* (L.) Moench – **K NE** – annual.  
17: 0678 [13]; 36: 1252 [4].
- Lolium multiflorum* Lam. – **K** – perennial.  
38: 1299 [8].
- Lolium perenne* L. – **NE** – annual (?).  
25: 0985 [3].
- Lolium rigidum* Gaudin – **DT NE** – annual.  
16: 0568 [3]; 25: 0985a [1].
- Melica magnolii* Gren. & Godr. – **NE** – perennial.  
17: 0686 [2].

*Melica minuta* L. – **K M** – stoloniferous perennial.

**20:** 0886 [7]; **31c:** 1140 [3]; **36:** 1241 [3]; **39:** 1319 [14]; **42:** 1348 [2].

*Piptatherum miliaceum* (L.) Coss. – **DT** – tufted perennial.

**16:** 0566 [9].

*Piptatherum thomasi* (Duby) Kunth – **K** – perennial.

**37:** 1276 [6].

*Poa annua* L. – **K M** – annual.

**19:** 0807 [11]; **41:** 1337 [3].

*Poa bulbosa* L. – **CB DT K NE VM** – tufted perennial, to 12 cm.

**5:** 0154 [6]; **12:** 0445 [4]; **17:** 0679 [4]; **28:** 1039 [8]; **36:** 1240 [6].

*Poa infirma* Kunth – **CB** – annual.

**5:** 0175 [13]; **17:** 0670 [9]; **19:** 0808 [5]; **20:** 0888 [11]; **36:** 1253 [5]; **38:** 1301 [11].

*Poa pratensis* L. – **M**.

**24:** 0950 [22].

*Polypogon subspathaceus* Req. – **CB** – annual.

**6e:** 0257 [10].

*Rostraria cristata* (L.) Tzvelev – **NE** – annual.

**17:** 0750 [1].

*Rostraria pubescens* (Lam.) Trin. – **NE** – annual.

**25:** 0991 [2].

*Setaria viridis* (L.) P. Beauv. – **M** – annual.

**23:** 0949 [20].

*Sphenopus divaricatus* (Gouan) Rchb. – **CB**.

**4:** 0132 [2]; **6e:** 0249 [11].

*Stipa capensis* Thunb. – **DT NE** – annual.

**16:** 0571 [5]; **17:** 0687 [9].

*Stipa tenacissima* L. – **CB DT** – tufted perennial.

**1:** 0060 [6]; **10:** 0338 [1].

*Trachynia distachya* (L.) Link – **DT NE** – annual.

**16:** 0569 [10]; **17:** 0684 [2]; **25:** 0984 [5].

*Vulpia ligustica* (All.) Link – **DT NE** – annual.

**15:** 0523 [1]; **16:** 0581 [2]; **25:** 0992 [1].

### *Iridaceae*

*Gladiolus italicus* Mill. – **DT M** – geophyte, flowers purplish pink, three lower tepals with white, dark-bordered median stripe, upper one twice as wide as laterals.

**16:** 0604 [2]; **20:** 0878 [3]; **21:** 0939 [3].

*Iris germanica* L. – **K** – perennial, flowers whitish.

**37:** 1272 [6].

*Moraea sisyrinchium* (L.) Ker Gawl. – **CB NE** – geophyte, flowers violet.

**4:** 0122 [14]; **18d:** 0806 [1].

*Romulea bulbocodium* (L.) Sebast. & Mauri – **CB DT K M NE** – geophyte, flowers pale lavender to purple, whitish outside, throat paler.

**6e:** 0246 [7]; **8:** 0315 [11]; **15:** 0550 [15]; **18e:** 0803 [5] (in fruit); **19:** 0871 [2]; **20:** 0894 [3]; **29:** 1094 [3]; **30:** 1130 [3]; **42:** 1358 [1].

*Romulea ligustica* Parl. – **K** – geophyte, flowers bright lilac.

**37:** 1277 [2].

*Romulea ramiflora* Ten. – **CB K M VM** – geophyte, flowers pale lilac to purplish pink, pale greenish outside.

**8:** 0316 [10]; **21:** 0940 [2]; **28:** 1035 [7]; **31:** 1147 [9].

### *Juncaceae*

*Juncus acutus* L. – **CB K M** – tufted perennial.

**4:** 0125 [11]; **6e:** 0244 [8]; **11f:** 0405 [2]; **19d:** 0867 [10]; **20:** 0896 [10]; **31:** 1143 [5].

*Juncus bufonius* L. – **CB K M** – annual.

**8:** 0322 [3]; **19:** 0861 [5]; **38:** 1297 [10].

*Juncus capitatus* Weigel – **K M** – annual.

**19:** 0860 [12]; **30b:** 1134 [2].

*Juncus conglomeratus* L. – **K** – perennial.

**37:** 1274 [8].

*Juncus effusus* L. – **K** – caespitose, 2 to m.

**41:** 1343 [7].

*Juncus rigidus* Desf. – **CB**.

**4:** 0124 [9].

*Luzula forsteri* (Sm.) DC. – **K** – tufted perennial.

**34:** 1208 [11]; **36:** 1232 [1]; **39:** 1322 [8]; **42:** 1357 [12].

### *Juncaginaceae*

*Triglochin barrelieri* Loisel. – **CB** – geophyte.

**4b:** 0121 [12]; **6e:** 0235 [13]; **10:** 0344 [13].

### *Liliaceae*

*Allium roseum* L. – **CB NE** – geophyte, bulb tuncis pitted, flowers white or pale pinkish with pale purple midvein outside.

**5:** 0213 [1]; **10:** 0359 [2]; **11e:** 0429 [1]; **18:** 0783 [8].

*Allium triquetrum* L. – **M NE VM** – geophyte, tepals white, with green stripe outside, flowers pendulous.

**17:** 0727 [10]; **19:** 0866 [10]; **28:** 1034 [7]; **29:** 1093 [12].

*Asparagus acutifolius* L. – **DT**.

**1:** 0051 [9].

*Asparagus albus* L. – **DT NE** – shrub 1-1.5 m.

**15:** 0517 [12] (sterile); **17:** 0729 [19].

*Asparagus stipularis* Forssk. – **CB**.

**7:** 0276 [11].

*Asphodeline lutea* (L.) Rchb. – **DT** – geophyte, flowers yellow.

**12:** 0461 [4].

*Asphodelus fistulosus* L. – **CB** – annual, tepals pale pink, midvein purple.

**7:** 0274 [10].

*Asphodelus ramosus* L. – **CB DT M VM** – geophyte, flowers white with dirty purplish midvein outside.

**11b:** 0374 [8]; **12:** 0466 [10]; **20:** 0909 [10]; **28:** 1033 [11].

*Bellevalia mauritanica* Pomel – **DT M VM** – geophyte, flowers blue to dirty violet in bud, turning pale to whitish with purplish midvein at anthesis, eventually brownish.

**12:** 0467 [10]; **20:** 0897 [12]; **28:** 1049 [1].

*Colchicum cupanii* Guss. – **DT** –

**1:** 0006 [6] (leaves); **15:** 0518 [12] (in fruit).

*Dipcadi serotinum* (L.) Medik. – **DT** – geophyte, perigon pale brownish purple, inner segments paler.

**15:** 0519 [10].

*Gagea chabertii* A. Terracc. – **K** – geophyte, tepals yellow, outside with green stripe.

**37:** 1288 [2].

*Hyacinthoides kroumiriensis* El Mokni & al. – **K** – geophyte, fruit glabrous. **Type gathering.**

**42:** 1352 [6].

**Note.** – Duplicates of the material collected during the Iter were used by El Mokni & al. (2014) to describe this new species discriminating from *Hyacinthoides aristidis* (Coss.) Rothm.

*Leopoldia comosa* (L.) Parl. – **DT** – geophyte, flowers brownish with yellow tip, buds dirty violet, sterile flowers bluish violet.

**15:** 0521 [7].

*Muscari neglectum* Ten. – **DT** – geophyte, flowers blackish blue with whitish teeth, sterile flowers light blue.

**12:** 0465 [7].

*Ornithogalum algeriense* Jord. & Fourr. – **DT M** – geophyte, tepals white, outside with green stripe, leaves with white median stripe.

**15:** 0520 [5]; **16:** 0578 [14]; **19:** 0869 [4]; **20:** 0913 [3].

*Ornithogalum umbellatum* L. – **VM** – geophyte, tepals white with green stripe outside.

**28:** 1037 [1].

*Ruscus hypophyllum* L. – **CB M NE** – perennial 20 cm, berry red.

**5:** 0156 [2]; **17:** 0742 [5]; **21:** 0917 [3] (sterile).

*Scilla peruviana* L. – **DT M** – geophyte, flowers pale whitish lavender, anthers yellow.

**16:** 0605 [9]; **29:** 1096 [1].

*Simethis mattiazii* (L.) Sacc. – **CB K M NE** – geophyte, flowers white, pale purplish-green to dirty violet outside.

**8:** 0311 [3]; **17:** 0744 [10]; **19:** 0857 [1]; **30:** 1123 [10].

*Smilax aspera* L. – **DT M NE** – woody climber.

**1:** 0036 [8]; **17:** 0741 [10] (sterile); **29:** 1095 [9] (with immature fruits).

*Tulipa sylvestris* subsp. *australis* (Link) Pamp. – **CB DT** – geophyte, flowers yellow tinged reddish outside.

**1:** 0057 [2]; **8:** 0298 [1]; **12:** 0489 [5]; **16:** 0579 [8].

### *Orchidaceae*

*Anacamptis longicornu* (Poir.) Bateman & al. – **DT** – geophyte, flowers white to pink.

**12:** 0468 [7].

*Neotinea maculata* (Desf.) Stearn – **NE** – geophyte, flowers whitish.

**25:** 0966 [1].

*Ophrys bombyliflora* Link – **CB NE VM** – geophyte, perigon green, lip brown-felted.

**5:** 0263 [1]; **9:** 0334 [11]; **18c:** 0797 [6]; **28:** 1032 [1].

*Ophrys fusca* Link – **DT** – geophyte, perigon green, lip brown-felted with very narrow green margin.

**1:** 0075 [1]; **3:** 0092 [1]; **12:** 0470 [1].

*Ophrys lutea* Cav. – **DT NE VM** – geophyte, perigon green, lip brown-felted with wide or narrow yellow border.

**1:** 0016 [6]; **12:** 0469 [3]; **17:** 0754 [1]; **18c:** 0802 [1]; **18c:** 0804 [1]; **28:** 1036 [1]; **28:** 1060 [1].

*Ophrys scolopax* subsp. *apiformis* (Desf.) Maire & Weiller – **CB DT NE** – geophyte, perigon white to pink, outer tepals with green midvein, lip downcurved, strongly ornamented, horns very short.

**5:** 0208 [1]; **10:** 0347 [1]; **12:** 0472 [4]; **17:** 0752 [1].

*Ophrys speculum* Link – **CB DT M NE** – geophyte, perigon green, lip brown with shiny greenish-blue centre.

**1:** 0026 [2]; **5:** 0262 [2]; **12:** 0464 [14]; **17:** 0755 [1]; **18c:** 0790 [10]; **19:** 0846 [1]; **25:** 0964 [16].

*Ophrys subfusca* (Rchb.) Hausskn. – **VM** – geophyte, tepals green, lip intermediate between *Ophrys fusca* and *O. lutea*.

**28:** 1056 [2].

*Ophrys tenthredinifera* Willd. – **DT NE VM** – geophyte, perigon pink, outer tepals with green stripe, lip-felt violet brown, margin yellowish green, gynostemium blunt.

**12:** 0471 [1]; **25:** 0965 [3]; **28:** 1055 [2].

### *Palmae*

*Chamaerops humilis* L. – **CB:** 1 m.

**6b:** 0228 [11].

*Phoenix dactylifera* L. – **CB** – subsontaneous tree, trunk 2 m.

**11f:** 0376 [10].

### *Posidoniaceae*

*Posidonia oceanica* (L.) Delile – **K** – perennial.

**31d:** 1154 [13].

### *Typhaceae*

*Typha domingensis* Pers. – **K** – perennial..

**32b:** 1185 [5].

## Results and discussion

A total of 1374 numbers were collected during the Iter Mediterraneum in Tunisia. These numbers correspond to: 1 alga, 6 gymnosperms belonging to 3 families, 14 pteridophytes belonging to 3 families, and 558 angiosperms: 440 dicotyledons belonging to 60 families and 118 monocotyledons belonging to 12 families. Disregarding planted trees and orna-

mentals, three taxa are new records for Tunisia: *Cerastium diffusum* subsp. *gussonei* (**K**), *Senecio leucanthemifolius* subsp. *mauritanicus* (**CB**, **DT**), and *Ulmus minor* subsp. *canescens* (**K**). All were known from the neighboring countries of North Africa.

New records to single phytogeographical regions are: **Kroumirie (K)**: *Carex sylvatica* subsp. *pau*, *Cyperus longus* subsp. *badius*, *Gagea chabertii*, *Myoporum tenuifolium*, *Ranunculus trichophyllus*, *Romulea ligustica* and *R. ramiflora*. – **Mogods (M)**: *Carex distans*, *Carex flacca* subsp. *serrulata*, *Carex remota*, *Clematis cirrhosa*, *Clematis flammula*, *Cymbalaria muralis*, *Fumaria bicolor*, *Genista aspalathoides*, *Myosotis discolor*, *Orobanche variegata*, *Ruscus hypophyllum*, *Silene tunetana*, *Stachys marrubiifolia*, *Thymelaea hirsuta*, *Viburnum tinus*. – **Dorsale Tunisienne (DT)**: *Astragalus longicaulis*, *Orobanche variegata*; **Tunisie du Nord-Est (NE)**: *Fumaria bicolor*, *Scrophularia laevigata*, *Valerianella microcarpa*; **Cap Bon (CB)**: *Carduus getulus*, *Cistus creticus* subsp. *eriocephalus*, *Cynoglossum cheirifolium* subsp. *heterocarpum*, *Fumaria bicolor*, *Helichrysum stoechas* subsp. *barrelieri*, *Laphangium luteoalbum*, *Medicago soleirolii*, *Spergularia maritima* subsp. *tunetana*.

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P. Campisi, M. G. Dia, G. Domina & F. M. Raimondo

## **Bryophytes collected during the 12th “Iter Mediterraneum” (Tunisia, 24 March – 4 April, 2014). First contribution**

### **Abstract**

Campisi, P., Dia, M. G., Domina, G. & Raimondo, F. M.: Bryophytes collected during the 12<sup>o</sup> “Iter Mediterraneum” (Tunisia, 24 March – 4 April 2014). First contribution. — *Bocconeae* 27(1): 63-68. 2015. — ISSN: 1120-4060 printed, 2280-3882 online.

Part of the bryophytes collected during Iter Mediterraneum XII is listed. Some noteworthy species were found: *Dicranella howei*, had so far been recorded only doubtfully from Tunisia; *Funaria hygrometrica*, *Grimmia laevigata*, *Grimmia trichophylla*, *Imbricobryum alpinum*, *Pogonatum nanum*, *Rhynchostegium riparioides*, *Scleropodium touretii*, *Scorpiurium circinatum*, *Thamnobryum alopecurum*, *Timmia barbuloidea*, *Tortella squarrosa*, *Tortula muralis* and *Tortula vahlana*, had not been reported from that country for more than half a century.

*Key words*: Flora of Tunisia, Bryophytes, Itinera Mediterranea, OPTIMA.

### **Introduction**

During the 12th Iter Mediterraneum of OPTIMA, held in Tunisia from 24 March to 4 April 2014, bryophyte specimens were collected by G. Domina and F. M. Raimondo. The material, 428 specimens in total, is deposited in the *Herbarium Mediterraneum Panormitanum* (PAL).

In this contribution a preliminary list is presented, limited to the so far identified species. Nomenclature and statement of presence in Tunisia follow Ros & al. (2007) for the liverworts and Ros & al. (2013) for the mosses.

### **Results**

55 taxa (1 hornwort, 11 liverworts, 44 mosses) belonging to 30 genera of 26 families have been identified. The presence of *Dicranella howei*, a species reported from Tunisia but doubtfully, is confirmed. Moreover, 14 taxa that had not been recorded from Tunisia for at least half a century have been found again. They are marked with an asterisk (\*) in the following list. Figures in **bold** refer to the numbered col-

lecting localities detailed in Greuter & Domina (2015: 23-25, Table 1). To make the paper self-contained, locality data are nevertheless repeated here.

#### ANTHOCEROTOPHYTINA (hornworts)

*Phymatoceros bulbiculosus* (Brot.) Stotler & al. – **18**: Gouv. Bizerte, coast c. 6.5 km NNW Bizerte, near the Roman grottos, 0-60 m a.s.l., 37°19'59"N, 9°50'43"E, 29/3/2014, *Raimondo 1*.

#### MARCHANTIOPHYTINA (liverworts)

*Calypogeia fissa* (L.) Raddi – **40**: Gouv. Jendouba, NE of Aïn Draham, 730 m a.s.l., 36°47'23"N, 8°41'22"E, 3/4/2014, *Raimondo 2*.

*Cephaloziella turneri* (Hook.) Müll. Frib. – **40**: Gouv. Jendouba, NE of Aïn Draham, 730 m a.s.l., 36°47'23"N, 8°41'22"E, 3/4/2014, *Raimondo 3*.

*Conocephalum conicum* (L.) Dumort. – **39**: Gouv. Jendouba, 4.5 km S of Aïn Draham, roadside, 680-700 m a.s.l., 36°44'20"N, 8°40'57"E, 3/4/2014, *Raimondo 4*.

*Frullania dilatata* (L.) Dumort. – **40**: Gouv. Jendouba, NE of Aïn Draham, 730 m a.s.l., 36°47'23"N, 8°41'22"E, 3/4/2014, *Raimondo 5*; **41**: Gouv. Jendouba, 2.8 km S of Aïn Draham, c. 1 km NE of the sport training centre, 660-670 m a.s.l., 36°45'16"N, 8°49'17"E, 4/4/2014, *Raimondo 6*.

*Jungermannia gracillima* Sm. – **41**: Gouv. Jendouba, 2.8 km S of Aïn Draham, c. 1 km NE of the sport training centre, 660-670 m a.s.l., 36°45'16"N, 8°49'17"E, 4/4/2014, *Raimondo 7*.

*Lunularia cruciata* (L.) Lindb. – **40**: Gouv. Jendouba, NE of Aïn Draham, 730 m a.s.l., 36°47'23"N, 8°41'22"E, 3/4/2014, *Raimondo 8*.

*Porella platyphylla* (L.) Pfeiff. – **40**: Gouv. Jendouba, NE of Aïn Draham, 730 m a.s.l., 36°47'23"N, 8°41'22"E, 3/4/2014, *Raimondo 9*.

*Reboulia hemisphaerica* (L.) Raddi – **40**: Gouv. Jendouba, NE of Aïn Draham, 730 m a.s.l., 36°47'23"N, 8°41'22"E, 3/4/2014, *Raimondo 10*.

*Riccia gougetiana* Durieu & Mont. var. *gougetiana* – **5**: Gouv. Nabeul, Massif of Jebel Sidi Abderrahmane, c. 9 km NW Al Middah, NW of small village, 200-280 m a.s.l., 36°46'45"N, 10°45'31"E, 25.3.2014, *Domina 11*.

*Targionia hypophylla* L. – **37**: Gouv. Jendouba, El Feidja National Park, track to a small forest house ENE of the Park Centre, 850-865 m a.s.l., 36°30'25"N, 8°19'47"E, 3/4/2014, *Raimondo 12*.

#### BRYOPHYTINA (mosses)

*Barbula unguiculata* Hedw. – **10**: Gouv. Nabeul, c. 1.6 km NW of El Haouaria, coast near the Phoenician-Roman caves, 5-70 m a.s.l., 37°3'28"N, 10°59'46"E, 26/3/2014, *Domina 13*.

*Bryum dichotomum* Hedw. – **5**: Gouv. Nabeul, Massif of Jebel Sidi Abderrahmane, c. 9 km NW Al Middah, NW of small village, 200-280 m a.s.l., 36°46'45"N, 10°45'31"E, 25.3.2014, *Domina 14*.

*Dicranella heteromalla* (Hedw.) Schimp. – **24**: Gouv. Bizerte, city of Bizerta, promenade by the beach hotels, 10 m a.s.l., 37°16'51"N, 9°52'38"E, 31/3/2014, *Raimondo 15*.

- \**Dicranella howei* Renauld & Cardot – **10**: Gouv. Nabeul, c. 1.6 km NW of El Haouaria, coast near the Phoenician-Roman caves, 5-70 m a.s.l., 37°3'28"N, 10°59'46"E, 26/3/2014, *Domina 16*; **21**: Gouv. Bizerte, Cap Serrat, E slope and around houses on the beach, 0-50 m a.s.l., 37°13'13"N, 9°13'24"E, 30/3/2014, *Raimondo 17*.
- Didymodon insulanus* (De Not.) M. O. Hill – **40**: Gouv. Jendouba, NE of Aïn Draham, 730 m a.s.l., 36°47'23"N, 8°41'22"E, 3/4/2014, *Raimondo 18*.
- Didymodon luridus* Hornsch. – **10**: Gouv. Nabeul, c. 1.6 km NW of El Haouaria, coast near the Phoenician-Roman caves, 5-70 m a.s.l., 37°3'28"N, 10°59'46"E, 25.3.2014, *Domina 19*; **17**: Gouv. Bizerte, Jebel Ichkeul, S of Lake Ichkeul, c. 8 km W of Menzel Bourgiba, peninsula N and hill W of the mineral well, 0-100 m a.s.l., 37°8'20"N, 9°41'32"E, 29/3/2014, *Raimondo 20*.
- Encalypta vulgaris* Hedw. – **12**: Gouv. Zaghuan, Massif of Jebel Zaghuan, road to Jebel Zaghuan from the NW side, 500-630 m a.s.l., 36°21'53"N, 10°5'25"E, 27/3/2014, *Domina 21*.
- Fissidens bryoides* Hedw. var. *bryoides* – **21**: Gouv. Bizerte, Cap Serrat, E slope and around houses on the beach, 0-50 m a.s.l., 37°13'13"N, 9°13'24"E, 30/3/2014, *Raimondo 22*.
- Fissidens serrulatus* Brid. – **40**: Gouv. Jendouba, NE of Aïn Draham, 730 m a.s.l., 36°47'23"N, 8°41'22"E, 3/4/2014, *Raimondo 23*.
- Fissidens taxifolius* Hedw. subsp. *taxifolius* – **40**: Gouv. Jendouba, NE of Aïn Draham, 730 m a.s.l., 36°47'23"N, 8°41'22"E, 3/4/2014, *Raimondo 24*.
- \**Funaria hygrometrica* Hedw. – **37**: Gouv. Jendouba, El Feidja National Park, track to a small forest house ENE of the Park Centre, 850-865 m a.s.l., 36°30'25"N, 8°19'47"E, 3/4/2014, *Raimondo 25*; **21**: Gouv. Bizerte, Cap Serrat, E slope and around houses on the beach, 0-50 m a.s.l., 37°13'13"N, 9°13'24"E, 30/3/2014, *Raimondo 26*.
- \**Grimmia laevigata* (Brid.) Brid. – **36**: Gouv. Jendouba, El Feidja National Park, between the Park Centre and the watch tower, on rocks, 710-770 m a.s.l., 36°29'34"N, 8°18'19"E, 3/4/2014, *Raimondo 27*.
- Grimmia lisae* De Not. – **40**: Gouv. Jendouba, NE of Aïn Draham, 730 m a.s.l., 36°47'23"N, 8°41'22"E, 3/4/2014, *Raimondo 28*.
- Grimmia pulvinata* (Hedw.) Sm – **16**: Gouv. Ben Arous, Jebel Ressayas, c. 3.5 km SW of Dawwar at Talib 'Ali, 80-200 m a.s.l., 36°36'24"N, 10°19'20"E, 28/3/2014, *Domina 29*.
- \**Grimmia trichophylla* Grev. – **21**: Gouv. Bizerte, Cap Serrat, E slope and around houses on the beach, 0-50 m a.s.l., 37°13'13"N, 9°13'24"E, 30/3/2014, *Raimondo 30*.
- Homalothecium sericeum* (Hedw.) Schimp. – **40**: Gouv. Jendouba, NE of Aïn Draham, 730 m a.s.l., 36°47'23"N, 8°41'22"E, 3/4/2014, *Raimondo 31*; **12**: Gouv. Zaghuan, Massif of Jebel Zaghuan, road to Jebel Zaghuan from the NW side, 500-630 m a.s.l., 37°8'20"N, 9°41'32"E, 27/3/2014, *Domina 32*.
- Hypnum cupressiforme* Hedw. var. *cupressiforme* – **40**: Gouv. Jendouba, NE of Aïn Draham, 730 m a.s.l., 36°47'23"N, 8°41'22"E, 3/4/2014, *Raimondo 33*; **41**: Gouv. Jendouba, 2.8 km S of Aïn Draham, c. 1 km NE of the sport training centre, 660-670 m a.s.l., 36°45'16"N, 8°49'17"E, 4/4/2014, *Raimondo 34*; **21**: Gouv. Bizerte, Cap Serrat, E slope and around houses on the beach, 0-50 m a.s.l., 37°13'13"N, 9°13'24"E, 30/3/2014, *Raimondo 35*.

- \*Imbribryum alpinum* (Huds. ex With.) N. Pedersen – **41**: Gouv. Jendouba, 2.8 km S of Aïn Draham, c. 1 km NE of the sport training centre, 660-670 m a.s.l., 36°45'16"N, 8°49'17"E, 4/4/2014, *Raimondo* 36.
- Kindbergia praelonga* (Hedw.) Ochyra – **40**: Gouv. Jendouba, NE of Aïn Draham, 730 m a.s.l., 36°47'23"N, 8°41'22"E, 3/4/2014, *Raimondo* 37; **37**: Gouv. Jendouba, El Feidja National Park, track to a small forest house ENE of the Park Centre, 850-865 m a.s.l., 36°30'25"N, 8°19'47"E, 3/4/2014, *Raimondo* 38.
- Leptodon smithii* (Hedw.) F. Weber & D. Mohr – **40**: Gouv. Jendouba, NE of Aïn Draham, 730 m a.s.l., 36°47'23"N, 8°41'22"E, 3/4/2014, *Raimondo* 39; **34**: Gouv. Jendouba, 1 km N of Aïn Draham, 770-780 m a.s.l., 36°47'24"N, 8°41'3"E, 2/4/2014, *Raimondo* 40; **25**: Gouv. Bizerte, c. 5 km SW of Bizerta, N Habib Arifa, along the road in parallel to the highway, 20-25 m a.s.l., 37°14'53"N, 9°55'3"E, 31/3/2014, *Raimondo* 41.
- Leucodon sciuroides* (Hedw.) Schwägr. – **40**: Gouv. Jendouba, NE of Aïn Draham, 730 m a.s.l., 36°47'23"N, 8°41'22"E, 3/4/2014, *Raimondo* 42; **37**: Gouv. Jendouba, El Feidja National Park, track to a small forest house ENE of the Park Centre, 850-865 m a.s.l., 36°30'25"N, 8°19'47"E, 03/4/2014, *Raimondo* 43; **34**: Gouv. Jendouba, 1 km N of Aïn Draham, 770-780 m a.s.l., 36°47'24"N, 8°41'3"E, 2/4/2014, *Raimondo* 44.
- Nogopterium gracile* (Hedw.) Crosby & W. R. Buck – **40**: Gouv. Jendouba, NE of Aïn Draham, 730 m a.s.l., 36°47'23"N, 8°41'22"E, 3/4/2014, *Raimondo* 45; **25**: Gouv. Bizerte, c. 5 km SW of Bizerta, N Habib Arifa, along the road in parallel to the highway, 20-25 m a.s.l., 37°14'53"N, 9°55'3"E, 31/3/2014, *Raimondo* 46.
- Orthotrichum affine* Schrad. ex Brid. – **34**: Gouv. Jendouba, 1 km N of Aïn Draham, 770-780 m a.s.l., 36°47'24"N, 8°41'3"E, 2/4/2014, *Raimondo* 47.
- Orthotrichum diaphanum* Schrad. ex Brid. – **40**: Gouv. Jendouba, NE of Aïn Draham, 730 m a.s.l., 36°47'23"N, 8°41'22"E, 3/4/2014, *Raimondo* 48; **25**: Gouv. Bizerte, c. 5 km SW of Bizerta, N Habib Arifa, along the road in parallel to the highway, 20-25 m a.s.l., 37°14'53"N, 9°55'3"E, 31/3/2014, *Raimondo* 49.
- Orthotrichum rupestre* Schleich. ex Schwägr. – **40**: Gouv. Jendouba, NE of Aïn Draham, 730 m a.s.l., 36°47'23"N, 8°41'22"E, 3/4/2014, *Raimondo* 50; **36**: Gouv. Jendouba, El Feidja National Park, between the Park Centre and the watch tower, on rocks, 710-770 m a.s.l., 36°29'34"N, 8°18'19"E, 3/4/2014, *Raimondo* 51.
- \*Pogonatum nanum* (Hedw.) P. Beauv. – **41**: Gouv. Jendouba, 2.8 km S of Aïn Draham, c. 1 km NE of the sport training centre, 660-670 m a.s.l., 36°45'16"N, 8°49'17"E, 4/4/2014, *Raimondo* 52; **21**: Gouv. Bizerte, Cap Serrat, E slope and around houses on the beach, 0-50 m a.s.l., 37°13'13"N, 9°13'24"E, 30/3/2014, *Raimondo* 53.
- Ptychostomum capillare* (Hedw.) Holyoak & N. Pedersen – **40**: Gouv. Jendouba, NE of Aïn Draham, 730 m a.s.l., 36°47'23"N, 8°41'22"E, 3/4/2014, *Raimondo* 54; **24**: Gouv. Bizerte, city of Bizerta, promenade by the beach hotels, 10 m a.s.l., 37°16'51"N, 9°52'38"E, 31/3/2014, *Raimondo* 55; **25**: Gouv. Bizerte, c. 5 km SW of Bizerta, N Habib Arifa, along the road in parallel to the highway, 20-25 m a.s.l., 37°14'53"N, 9°55'3"E, 31/3/2014, *Raimondo* 56; **21**: Gouv. Bizerte, Cap Serrat, E slope and around houses on the beach, 0-50 m a.s.l., 37°13'13"N, 9°13'24"E, 30/3/2014, *Raimondo* 57.
- Ptychostomum torquescens* (Bruch & Schimp.) Ros & Mazimpaka – **1**: Gouv. Ben Arous, Massif of Bou Kornine, c. 3-4 km SSE of Hammam-Lif, 120-300 m a.s.l., 36°42'15"N, 10°20'31"E, 24.3.2014, *Domina* 58.

- \**Rhynchostegium riparioides* (Hedw.) Cardot – **40**: Gouv. Jendouba, NE of Aïn Draham, 730 m a.s.l., 36°47'23"N, 8°41'22"E, 3/4/2014, *Raimondo* 59.
- \**Scleropodium touretii* (Brid.) L. F. Koch – **40**: Gouv. Jendouba, NE of Aïn Draham, 730 m a.s.l., 36°47'23"N, 8°41'22"E, 3/4/2014, *Raimondo* 60; **16**: Gouv. Ben Arous, Jebel Ressayas, c. 3.5 km SW of Dawwar at Talib 'Ali, 80-200 m a.s.l., 36°36'24"N, 10°19'20"E, 28/3/2014, *Domina* 61.
- \**Scorpiurium circinatum* (Bruch) M. Fleisch. & Loeske – **24**: Gouv. Bizerte, city of Bizerta, promenade by the beach hotels, 10 m a.s.l., 37°16'51"N, 9°52'38"E, 31/3/2014, *Raimondo* 62; **1**: Gouv. Ben Arous, Massif of Bou Kornine, c. 3-4 km SSE of Hammam-Lif, 120-300 a. s. l., 36°42'15"N, 10°20'31"E, 24.3.2014, *Domina* 63.
- Sphagnum auriculatum* Schimp – **41**: Gouv. Jendouba, 2.8 km S of Aïn Draham, c. 1 km NE of the sport training centre, 660-670 m a.s.l., 36°45'16"N, 8°49'17"E, 3/4/2014, *Raimondo* 64.
- Syntrichia laevipila* Brid. – **40**: Gouv. Jendouba, NE of Aïn Draham, 730 m a.s.l., 36°47'23"N, 8°41'22"E, 3/4/2014, *Raimondo* 65; **34**: Gouv. Jendouba, 1 km N of Aïn Draham, 770-780 m a.s.l., 36°47'24"N, 8°41'3"E, 2/4/2014, *Raimondo* 66.
- \**Thamnobryum alopecurum* (Hedw.) Nieuwl. ex Gangulee var. *alopecurum* – **37**: Gouv. Jendouba, El Feidja National Park, track to a small forest house ENE of the Park Centre, 850-865 m a.s.l., 36°30'25"N, 8°19'47"E, 3/4/2014, *Raimondo* 67.
- \**Timmiella barbulooides* (Brid.) Mönk. – **17**: Gouv. Bizerte, Jebel Ichkeul, S of Lake Ichkeul, c. 8 km W of Menzel Bourgiba, peninsula N and hill W of the mineral well, 0-100 m a.s.l., 37°8'20"N, 9°41'32"E, 29/3/2014, *Raimondo* 68.
- Tortella flavovirens* (Bruch) Broth. var. *flavovirens* – **1**: Gouv. Ben Arous, Massif of Bou Kornine, c. 3-4 km SSE of Hammam-Lif, 120-300 m a.s.l., 36°42'15"N, 10°20'31"E, 24.3.2014, *Domina* 69.
- Tortella nitida* (Lindb.) Broth. – **10**: Gouv. Nabeul, c. 1.6 km NW of El Haouaria, coast near the Phoenician-Roman caves, 5-70 m a.s.l., 37°3'28"N, 10°59'46"E, 25.3.2014, *Domina* 70.
- \**Tortella squarrosa* (Brid.) Limpr. – **1**: Gouv. Ben Arous, Massif of Bou Kornine, c. 3-4 km SSE of Hammam-Lif, 120-300 m a.s.l., 36°42'15"N, 10°20'31"E, 24.3.2014, *Domina* 71.
- Tortula subulata* Hedw. – **40**: Gouv. Jendouba, NE of Aïn Draham, 730 m a.s.l., 36°47'23"N, 8°41'22"E, 3/4/2014, *Raimondo* 72.
- \**Tortula muralis* Hedw. – **1**: Gouv. Ben Arous, Massif of Bou Kornine, c. 3-4 km SSE of Hammam-Lif, 120-300 m a.s.l., 36°42'15"N, 10°20'31"E, 24.3.2014, *Domina* 73.
- \**Tortula vahaliana* (Schultz.) Mont. – **21**: Gouv. Bizerte, Cap Serrat, E slope and around houses on the beach, 0-50 m a.s.l., 37°13'13"N, 9°13'24"E, 30/3/2014, *Raimondo* 74.
- Trichostomum brachydontium* Bruch – **40**: Gouv. Jendouba, NE of Aïn Draham, 730 m a.s.l., 36°47'23"N, 8°41'22"E, 3/4/2014, *Raimondo* 75; **24**: Gouv. Bizerte, city of Bizerta, promenade by the beach hotels, 10 m a.s.l., 37°16'51"N, 9°52'38"E, 31/3/2014, *Raimondo* 76; **17**: Gouv. Bizerte, Jebel Ichkeul, S of Lake Ichkeul, c. 8 km W of Menzel Bourgiba, peninsula N and hill W of the mineral well, 0-100 m a.s.l., 37°8'20"N, 9°41'32"E, 29/3/2014, *Raimondo* 77; **1**: Gouv. Ben Arous, Massif of Bou Kornine, c. 3-4 km SSE of Hammam-Lif, 120-300 a.s.l., 36°42'15"N, 10°20'31"E, 24.3.2014, *Domina* 78.

- Weissia condensa* (Voit) Lindb. var. *condensa* – **5**: Gouv. Nabeul, Massif of Jebel Sidi Abderrahmane, c. 9 km NW Al Middah, NW of small village, 200-280 m a.s.l., 36°46'45"N, 10°45'31"E, 25.3.2014, *Domina* 79; **16**: Gouv. Ben Arous, Jebel Ressay, c. 3.5 km SW of Dawwar at Talib ‘Ali, 80-200 m a.s.l., 36°36'24"N, 10°19'20"E, 28/3/2014, *Domina* 80.
- Zygodon rupestris* Schimp. ex Lorentz – **40**: Gouv. Jendouba, NE of Aïn Draham, 730 m a.s.l., 36°47'23"N, 8°41'22"E, 3/4/2014, *Raimondo* 81; **34**: Gouv. Jendouba, 1 km N of Aïn Draham, 770-780 m a.s.l., 36°47'24"N, 8°41'3"E, 2/4/2014, *Raimondo* 82.

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A. Guttová, J. Vondrák, M. Schultz & R. El Mokni

## Lichens collected during the 12th “Iter Mediterraneum” in Tunisia, 24 March – 4 April 2014

### Abstract

Guttová, A., Vondrák, J., Schultz, M. & El Mokni, R: Lichens collected during the 12 “Iter Mediterraneum” in Tunisia, 24 March – 4 April, 2014. — *Bocconea* 27: 69-76. 2015. — ISSN: 1120-4060 printed, 2280-3882 online.

A preliminary list of the so far identified lichens collected during the 12th OPTIMA Iter to Tunisia in 2014 is presented. Altogether 37 collecting sites in the northern part of the country were visited. The lichen collection comprises  $\leq 300$  capsules kept in SAV, of which duplicates are being prepared for the Palermo Herbarium (PAL). Ecological and distributional data are provided for 46 taxa, 23 of which had not been included in the published checklist of lichens of Tunisia (e. g. *Anema nummularium*, *Athallia skii*, *Caloplaca pollinii*, *Heppia adglutinata*, *Scytinium palmatum*, *Leprocaulon microscopicum*, *Solenopsora grisea*, and *S. olivacea* subsp. *olivacea*). In an additional list, samples recently collected in the southern and eastern Mediterranean region are mentioned, which include elements characteristic of the habitats of N African mountains (e.g. the Atlas ranges) and Israel (e.g. *Gloeoheppia turgida*, *Lichinella algerica*, and *Peccania fontqueriana*).

*Key words*: biodiversity, lichenized fungi, North Africa.

### Introduction

Tunisia is situated at the junction of the two basins that make up the Mediterranean – the Mashreq (in Arab: East) and the Maghreb (in Arab: West) and contains many interesting habitats awaiting to be explored from a lichenological point of view (Seaward 1996). The mountain ranges in the north and east are part of the Tell Atlas and Saharan Atlas. The arid high steppes are drained by oueds (wadis), and the semi-arid low steppes end at a flat coastal strip. The bioclimatic zones cover a south-north gradient, from the hyper-arid Saharan area to the humid Mediterranean mountains. Forests and matorral cover 5 % of the land and include oak woods (*Quercus canariensis*, *Q. ilex*, *Q. suber*, *Q. coccifera*) and stands of, e.g., *Olea europaea*, *Pistacia lentiscus*, *Pinus halepensis*, and *Tetraclinis articulata*. Approximately 20 % of the country are covered by steppes dominated among others by *Stipa tenacissima*, *Artemisia herba-alba*, and *Rhanterium sua-veolens* (Ghrabi Gammar 2011).

Seaward (1996) presented a comprehensive overview of Tunisia’s lichen diversity, based on a detailed literature survey, the revision of herbarium material, and his own collections. In the same paper he summarised the history of the country’s lichenological investigation, providing lists of collectors, herbaria, exsiccate, and unpublished reports. The checklist comprises 395 species and additional infraspecific taxa (3 subspecies, 13 varieties, and 4 formae).

The present paper is a contribution to the knowledge of lichen diversity of Tunisia. It includes ecological and distributional data linked to the species so far identified from among the lichen material collected during the 12th OPTIMA Iter to Tunisia in 2014. Examples of taxa with larger, macroscopic thalli are members of *Cladonia*, *Collema*, *Degelia*, *Diploschistes*, *Fulgensia*, *Gyalecta*, *Chrysothrix*, *Nephroma*, *Opegrapha*, *Peltigera*, *Physcia*, *Psora*, *Ramalina*, *Roccella*, *Toninia*, *Umbilicaria*, *Xanthoparmelia*, and *Xanthoria*. In addition, microlichens were also collected (e.g.: *Agonimia*, *Catillaria*, *Gyalecta*, *Lecania*, and *Lecanora*); their identification is in progress, with the objective to prepare a comprehensive paper.

## Material and Methods

During the 12th OPTIMA Iter 2014, we (AG, REM) sampled 37 localities, all in the northern part of Tunisia (Table 1). They cover a wide range of habitats on limestone and siliceous bedrock – saline shores, coastal sand dunes, phrygana and macchia with rocky outcrops, *Tetraclinis articulata* groves, *Quercus* woodlands, from sea level up to an elevation of ca. 880 m a.s.l. We collected lichens from different types of substrate present at these sites: tree bark, decayed wood, soil, bones, rocks. In total, our lichen collection comprises  $\leq 300$  capsules, to be kept in SAV, of which duplicates are being prepared for the Palermo herbarium (PAL). Where indicated, further duplicates are deposited in HBG and in the herb. J. Vondrák. Identification of the material is based on standard light microscopy, molecular markers were also studied in selected samples. The nomenclature, in

Table 1. List of collecting sites (coordinates in degrees, decimal minutes).

No	area	locality	latitude	longitude	altitude	date
1	Cap Bon	Bou Kornine Mt.	36° 42.352'	10° 20.672'	119 m	24/3/2014
2	Cap Bon	Bou Kornine Mt.	36° 42.223'	10° 20.591'	176 m	24/3/2014
3	Cap Bon	Bou Kornine Mt.	36° 42.189'	10° 20.510'	227 m	24/3/2014
4	Cap Bon	Bou Kornine Mt.	36° 43.525'	10° 19.545'	70 m	24/3/2014
5	Cap Bon	Soliman	36° 42.315'	10° 27.378'	11 m	24/3/2014
6	Cap Bon	Massif de Djebel Sidi Abderrahmane	36° 46.661'	10° 45.608'	202 m	25/3/2014
7	Cap Bon	Massif de Djebel Sidi Abderrahmane	36° 47.002'	10° 45.688'	193 m	25/3/2014
8	Cap Bon	Chot Ezzorhou	36° 40.811'	10° 56.237'	10 m	25/3/2014
9	Cap Bon	coastline between Elentoba and Korba	36° 37.129'	10° 53.377'	4 m	25/3/2014
10	Cap Bon	Djebel Haouaria Mt.	37° 04.282'	11° 02.456'	367 m	26/3/2014
11	Cap Bon	Les Grottes	37° 03.451'	10° 59.694'	18 m	26/3/2014

Table 1. continued.

12	Cap Bon	coastline between Kalibia and Sidi Jamel Eddine	36° 48.100'	11° 01.722'	12 m	26/3/2014
13	Cap Bon	ZaghouanMt.	36° 21.883'	10° 05.281'	593 m	27/3/2014
14	Cap Bon	ZaghouanMt.	36° 22.047'	10° 05.390'	618 m	27/3/2014
15	Cap Bon	ZaghouanMt.	36° 21.852'	10° 05.215'	590 m	27/3/2014
16	Cap Bon	Oued Enzit	36° 27.135'	10° 18.233'	190 m	27/3/2014
17	Cap Bon	Djebel Ressayas	36° 35.847'	10° 19.359'	243 m	28/3/2014
18	Les Mogods	Djebel Ichkeul	37° 08.277'	9° 41.511'	55 m	29/3/2014
19	Les Mogods	Djebel Ichkeul	37° 08.230'	9° 41.454'	82 m	29/3/2014
20	Les Mogods	Djebel Ichkeul	37° 07.929'	9° 41.336'	7 m	29/3/2014
21	Les Mogods	Corniche - La Grotte	37° 19.956'	9° 50.593'	27 m	29/3/2014
22	Les Mogods	along the road between Teskrine (Teskraia) and Sejeune, near Fejet Errich	37° 13.550'	9° 29.602'	205 m	30/3/2014
23	Les Mogods	along the road between Teskrine (Teskraia) and Sejeune, near Fejet Errich	37° 13.547'	9° 29.690'	235 m	30/3/2014
24	Les Mogods	Cap Serrat	37° 13.213'	9° 13.374'	15 m	30/3/2014
25	Les Mogods	Cap Serrat	37° 13.362'	9° 13.438'	37 m	30/3/2014
26	Les Mogods	Bizerte	37° 14.941'	9° 54.946'	18 m	31/3/2014
27	Les Mogods	Bizerte	37° 15.245'	9° 55.561'	10 m	31/3/2014
28	Les Mogods	along the road P7 between Sejenane and Oued Zitoun	37° 00.960'	9° 19.617'	402 m	1/4/2014
29	Kroumirie	Tabarka	36° 56.757'	8° 42.445'	194 m	2/4/2014
30	Kroumirie	Tabarka	36° 57.977'	8° 52.592'	38 m	2/4/2014
31	Kroumirie	Ein Draham	36° 47.390'	8° 41.001'	775 m	2/4/2014
32	Kroumirie	Massif de Feidja	36° 29.313'	8° 18.333'	771 m	3/4/2014
33	Kroumirie	Natural Park el Feidja, Ain Soltane	36° 30.330'	8° 20.194'	820 m	3/4/2014
34	Kroumirie	Natural Park el Feidja, Ain Soltane	36° 31.432'	8° 19.681'	876 m	3/4/2014
35	Kroumirie	Ein Draham	36° 44.363'	8° 40.988'	688 m	3/4/2014
36	Kroumirie	Ein Draham	36° 45.255'	8° 41.266'	661 m	4/4/2014
37	Kroumirie	Ein Draham	36° 43.755'	8° 42.314'	562 m	4/4/2014

*Teloschistaceae*, follows Arup & al. (2013), and in *Collembataceae*, Otálora & al. (2014). Species marked by an asterisk (\*) were not reported by Seaward (1996) in his checklist of Tunisian lichens. Figures in **bold** refer to the collecting locality as numbered in Table 1. Collecting numbers (in italics) indicate the sequential numbering of lichens collected by Guttová & El Mokni during the 12th OPTIMA Iter.

## Results

This preliminary list of identified samples comprises 23 taxa that were not reported in the extant checklist of Tunisian lichens (Seaward 1996). They include several *Caloplaca* species, reflecting the big progress recently achieved in the knowledge of this group (e. g., Arup & al. 2013; Joshi & al. 2011; Šoun & al. 2011; Vondrák & al. 2008, 2009a-b, 2010a, 2010b). During the excursion we focused on collecting members of the genus *Solenopsora*, where phylogenetic relationship among Mediterranean species were disclosed recently (Guttová & al. 2014); currently, the phylogeography of the two sister species *S. candicans* and *S. cesatii* is being studied, with an aim to clarify their origin in the Carpathians, at the periphery of their range in continental Europe (Fačková 2015). We added at the end a list of samples recently collected in the southern and eastern Mediterranean region, to document characteristic elements of North African mountain habitats, e.g. in the Atlas ranges, and of Israel. These are mostly members of *Lichinaceae* – common species such as *Lichinella stipatula* or members of the genus *Peccania*, which is in need of revision (Schultz & al. 2009).

- \**Anema nummularium* (Dufour) Nyl. – **13**: semi-natural outcrops of limestone rock along the dirty road bank, on perpendicular rock faces, *106* (SAV, PAL, HBG)
- \**Arthonia cinnabarina* (DC.) Wallr. – **10**: on twigs of *Erica* and *Phyllirea* growing on the cliff tops, *1, 2, 3, 4, 6* (all: SAV)
- Athallia* aff. *holocarpa* (Hoffm.) Arup & al. – **1**: on branches of *Tetraclinis articulata* (SAV, PAL, herb. Vondrák); **10**: on wood of *Erica* and *Phyllirea* branches growing on the cliff tops, *19* (SAV, PAL, herb. Vondrák)
- \**Athallia skii* (Khodos. & al.) Arup & al. – **8**: on fallen trunk of *Phoenix dactylifera*, *80* (SAV, PAL, herb. Vondrák)
- Blastenia* cf. *hungarica* (H. Magn.) Arup & al. – **10**: on wood of *Erica* and *Phyllirea* branches growing on the cliff tops *7, 22* (both: SAV, PAL, herb. Vondrák)
- \**Blastenia coralliza* (Arup & Åkelius) Arup & al. – **34**: on *Quercus* sp., *48* (SAV, PAL, herb. Vondrák)
- Caloplaca aegatica* Giralt & al. – **10**: on wood of *Erica* and *Phyllirea* branches growing on the cliff tops *5, 7, 8, 17* (all: SAV, PAL, herb. Vondrák)
- Caloplaca haematites* (Chaub. ex St.-Amans) Zwackh – **33**: on bark of *Quercus suber*, *57* (SAV, PAL, herb. Vondrák)
- \**Caloplaca pollinii* (A. Massal.) Jatta – **22**: on bark of *Quercus suber*, *53* (SAV, PAL, herb. Vondrák)
- \**Caloplaca stillicidiorum* (Vahl.) Lyngé – **1**: on branches of *Callitris articulate*, *62* (SAV, PAL, herb. Vondrák)

- \**Caloplaca ulcerosa* Coppins & P. James – **5**: on dry twigs among grass 39 (SAV, PAL, herb. Vondrák); **8**: on fallen trunk of *Phoenix dactylifera*, 80 (SAV, PAL, herb. Vondrák)
- \**Flavoplaca austrocitrina* (Vondrák & al.) Arup & al. – **5**: on dry twigs among grass, 39 (SAV, PAL, herb. Vondrák); **8**: on fallen trunk of *Phoenix dactylifera*, 80 (SAV, PAL, herb. Vondrák)
- Flavoplaca* cf. *austrocitrina* (Vondrák & al.) Arup & al. – **5**: on bone lying on the soil, 24 (SAV, PAL, herb. Vondrák); on sandstone rock among grass, 28 (SAV, PAL, herb. Vondrák)
- \**Flavoplaca oasis* (A. Massal.) Arup & al. – **5**: on sandstone rock among grass, 29, 34 (both: SAV, PAL, herb. Vondrák)
- \**Gyalolechia flavorubescens* (Huds.) Arup & al. – **10**: on wood of *Erica* and *Phyllirea* branches growing on the cliff tops, 2, 16 (both: SAV, PAL, herb. Vondrák); **21**: on *Juniperus* twigs, 47 (SAV, PAL, herb. Vondrák)
- \**Haloplaca* aff. *suaedae* (O. L. Gilbert & Coppins) Arup & al. – **5**: on wood of dry bushes, 49 (SAV, PAL, herb. Vondrák); **8**: on branches of *Rhetama* sp., 74 (SAV, PAL, herb. Vondrák); **21**: on *Juniperus* twigs, 41, 43 (both: SAV, PAL, herb. Vondrák)
- \**Heppia adglutinata* (Kremp.) A. Massal. – **24**: sea coast with schistous outcrops and *Quercus suber*, on soil, 93 (SAV, PAL, HBG).
- Hyperphyscia adglutinata* (Flörke) H. Mayrhofer & Poelt – **16**: on bark of *Olea*, *s.n.* (SAV)
- Lecania spadicea* (Flot.) Zahlbr. – **19**: in fissures and on faces of calcareous rocks, *s.n.* (SAV); **20**: in fissures and on faces of calcareous rocks, *s.n.* (SAV)
- \**Leprocaulon microscopicum* (Vill.) Gams ex D. Hawksw. – **25**: on sandstone rock, *s.n.* (SAV)
- Lichinella stipitata* Nyl. – **3**: on hard calcareous boulder with crystalline intrusions, 98 (SAV, PAL, HBG)
- Lobaria amplissima* (Scop.) Forssell – **35**: on bark of *Quercus canariensis*, *s.n.* (SAV)
- Lobaria pulmonaria* (L.) Hoffm. – **31**: on mossy bark of *Quercus canariensis*, *s.n.* (SAV)
- Normandina pulchella* (Borrer) Nyl. – **31**: on mossy bark of *Quercus canariensis*, *s.n.* (SAV)
- Peltula* cf. *euploca* (Ach.) Poelt – **3**: on hard calcareous boulder with crystalline intrusions, 98 (SAV, PAL, HBG)
- Physcia biziana* (A. Massal.) Zahlbr. – **20**: on bark of *Olea*, *s.n.* (SAV)
- Placynthium* sp. – **13**: semi-natural outcrops of limestone rock along the dirty road bank, on perpendicular rock faces, 106 (SAV, PAL, HBG)
- Polychidium muscicola* (Sw.) Gray – **32**: among mosses on crystalline rock, *s.n.* (SAV)
- Psora decipiens* (Hedw.) Hoffm. – **4**: on calcareous soil, *s.n.* (SAV)
- Psorotichia* cf. *diffracta* (Nyl.) Forssell (epruinose form) – **13**: semi-natural outcrops of limestone rock along the dirty road bank, on perpendicular rock faces, 106 (SAV, PAL, HBG)
- \**Scytinium palmatum* (Hudson) Gray – **32**: among mosses on crystalline rock, *s.n.* (SAV)
- \**Scytinium schraderi* (Bernh.) Otálora & al. – **1**: on calcareous soil, 129 (SAV); **3**: on calcareous soil, 112 (SAV); **4** (SAV); **13**: on calcareous soil, 119 (SAV)
- \**Scytinium tenuissimum* (Dicks.) Otálora & al. – **1**: on calcareous soil, 129 (SAV); **3**: on calcareous soil, 109 (SAV); **13**: on calcareous soil, 120 (SAV); **24**: on soil, 124 (SAV)

- \**Scytinium teretiusculum* (Wallr.) Otálora & al. – **24**: on bark of *Quercus suber*, 125, 126 (SAV)
- \**Scytinium turgidum* (Ach.) Otálora & al. – **1**: on calcareous soil, 129 (SAV); **24**: on soil, 127 (SAV)
- Solenopsora candicans* (Dicks.) J. Steiner – **3**: siliceous boulder in open place between scrub vegetation, in fissures of rock, *s.n.* (SAV); **7**: on sheltered parts or in fissures of the sand- stone rock, *s.n.* (SAV); **19**: shaded calcareous outcrops, on rock faces, *s.n.* (SAV); **28**: calcareous outcrops on the pasture, on rock, *s.n.* (SAV)
- \**Solenopsora grisea* (Bagl.) Kotlov – **13**: limestone outcrops among the scrub vegetation, *s.n.* (SAV); **14**: karst formations among the scrub vegetation (*Olea* sp.), on sheltered parts of the rock, *s.n.* (SAV); **17**: sheltered limestone rocks in the pass, in fissures, *s.n.* (SAV); **19**: semi-shaded calcareous outcrops, in fissures and on faces of calcareous rocks, *s.n.* (SAV). – *Additional specimen*: Tunesien: Djebel Zaghouan (NW-Flanke). Felspartien abseits der Straße zur Relaisstation bei 700–780 m, 19/4/1982, *Poelt* as *Solenopsora* sp.(GZU 41–82)
- \**Solenopsora olivacea* (Dufour ex Fr.) Kiliás subsp. *olivacea* – **19**: shaded calcareous outcrops, on rock faces, *s.n.* (SAV)
- Solenopsora vulturiensis* A. Massal. – **7**: on sheltered parts or in fissures of the sandstone rock, *s.n.* (SAV); **10**: on sandstone rocks and surrounding soil, *s.n.* (SAV); **23**: siliceous sandstone outcrops on the summint, in fissures, *s.n.* (SAV); **31**: on siliceous sandstone rocks, *s.n.* (SAV); **32**: sandstone cliffs, in sheltered parts of the rock, *s.n.* (SAV)
- \**Synalissa ramulosa* (Hoffm.) Fr. – **2**: on calcareous rock, 95 (SAV, PAL, HBG). – DNA sample 4724
- \**Teloschistes chrysophthalmus* (L.) Th. Fr. – **35**: on bark of *Quercus canariensis* (SAV – C OPTIMA ITER 2014\_s.n.)
- Tephromela atra* (Huds.) Hafellner – **3**: on hard siliceous metamorphic rock (SAV – C OPTIMA ITER 2014\_s.n.)
- Thelopsis isiaca* Stizenb. – **12**: on bark of *Cupressus* sp., *s.n.* (SAV); **18**: on bark of *Pinus halepensis*, *s.n.* (SAV)
- Tornabea scutellifera* (With.) J. R. Laundon – **10**: on wood of *Erica* and *Phyllirea* branches growing on the cliff tops (SAV – C OPTIMA ITER 2014\_8)
- Variospora aurantia* (Pers.) Arup & al. – **9**: on calcareous rock, 69 (SAV, PAL, herb. Vondrák)

#### Additional samples collected in the southern and eastern Mediterranean region:

- Gloeoheppia turgida* (Ach.) Gyeln. – Morocco, Anti Atlas, Tiznit, near the village Tizoughrane (road R104), open calcareous outcrops above the village Albid, on soil in rock fissures, elev. 862 m, 29°33.655'N 9°21.803'W, 3/5/2013, *Guttová & al.* (SAV)
- Heppia adglutinata* (Kremp.) A. Massal. – Morocco, Anti Atlas, Tiznit, near the village Tizoughrane (road R104), open calcareous outcrops above the village Albid, on soil in rock fissures, elev. 862 m, 29°33.655'N 9°21.803'W, 3/5/2013, *Guttová & al.* (SAV)

- Lichinella algerica*** (J. Steiner) P. P. Moreno & Egea – Morocco, Anti Atlas, Guelmin-Es-Smara, Tata, along the road R109 between Tata and Igheem vádí near Imitek, in fissures of sandstone rock, elev. 714 m, 29°42.207'N 8°6.537'W, 4/5/2013, A. Guttová & al. (SAV, HBG); Israel, Southern District – Negev Desert – Eilat Mts: Eilat, Hidden valley, on shaded sandstone rocks on a mountain pass, elev. 333 m, 29°40.117'N, 34°56.432'E, 5/3/2014 Guttová & al. (SAV)
- Lichinella cribellifera*** (Nyl.) P. P. Moreno & Egea – Morocco, Rabat-Salé-Zemmour-Zaër, Rommani, the valley of the stream Oued el Mechra along the road R404, on soil in rock fissures, elev. 296 m, 33°32.009'N 6°37.671'W, 30/4/2013, Guttová & al. (SAV, HBG).
- Peccania coralloides*** (A. Massal.) A. Massal. – Morocco, Haut Atlas Mts, Meknes Tafilalt, Ar-Rachidia, Gorges du Ziz, the valley of the river Oued Ziz, calcareous outcrops near the tunnel Zaval, on rock, elev. 1158 m, 32°5.722'N 4°22.228'W, 8/5/2013, Guttová & al. (SAV, HBG).
- Peccania fontqueriana*** P. P. Moreno & Egea – Morocco, Anti Atlas, Tiznit, Guttová & al. (SAV)
- Peccania tiruncula*** (Nyl.) Henssen – Morocco, Anti Atlas, Guelmin-Es-Smara, Guttová & al. (SAV, HBG)
- Seirophora contortuplicata*** (Ach.) Frödén – Morocco, Moyen Atlas Mts, Oualegh, limestone cliffs along the road N13 between Timahdite and Oualegh, on rock, elev. 2161 m, 32°59.917'N, 5°4.449'W, 2/5/2013, Guttová & al. (SAV)
- Seirophora villosa*** (Ach.) Frödén – Morocco, NW foot of Anti Atlas Mts, Aït Baiha, along the road R105 from Biougra to Tafraoute, on twigs of *Argania spinosa*, elev. 521 m, 30°6.287'N, 9°13.416'W, 2/5/2013, Guttová & al. (SAV)

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