Diachronic analysis of biodiversity: Study of a herbarium “reviewed” by Francesco Cupani (1657–1710) at the end of the 17th century

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Abstract
The subject of this paper is the study of the pre-Linnaean herbarium with the inventory number “VII F1 Hortus Botanicus Catinensis” belonging to the Department of Biological, Geological and Environmental Sciences (University of Catania). The volume examined comprises 186 pages (originally 190) with 1–9 specimens on each sheet. The herbarium samples mainly include angiosperms (386), but a few taxa belonging to gymnosperms (1) and pteridophytes (4) are also present. Unfortunately, some specimens are partially or entirely damaged or even missing; nonetheless, it has been possible to identify most of them. As far as the nomenclature is concerned, we find two kinds of handwriting (of which only that of Cupani can be identified), numerous corrections and/or integrations of the polylogus and different types of ink that were used. These elements allow us to state that we are speaking of a herbarium which was prepared by an unknown person and reviewed by Cupani.

Keywords: Cupani, exsiccata, herbarium, pre-Linnaean, taxonomy

Introduction
Francesco Cupani (Mirto (ME) 1657-Palermo 1710), a friar of the Franciscan Third Order and a botanist of the seventeen century, was known and appreciated by many European scholars of his time. He wholeheartedly developed a network of relationships and exchanges and contributed to the spread of the knowledge of Sicilian flora. He spent the whole of his life on the preparation of a work which he did not succeed in publishing: “Panphyton siculum”, which should have been a natural history of Sicily. He was for many years the curator of the Hortus Catholicus (the Misilmeri Botanical Garden, sponsored by the Prince of Cattolica) which had, among other things, the task of producing herbaria. The collections of exsiccata were essential instruments of the “scientific network” which Cupani had created with many other botanists of his time (Pulvirenti, Costa, et al. 2015a).

To investigate Cupani’s role in seventeen-century botany (not only that of Sicily) a research project on his works and on his specific contribution to the processes of the formation of the modern systems of nomenclature is under way (Costa et al. 2016).

In this context, researchers have begun to study the two herbaria which are kept in the Department of Biological, Geological and Environmental Sciences (University of Catania) and which are related to the famous pre-Linnaean botanist. In a previous paper (Pulvirenti, Indriolo, et al. 2015b) we examined the volume with the inventory number “VII F2 Hortus Botanicus Catinensis”, which was already available online at http://www.dipbot.unict.it/erbario/cupani/index.html.

The aim of this paper is the study of the volume with the inventory number “VII F1 Hortus Botanicus Catinensis” (Figures 1 and 2).

Histories of the two herbaria
The two collections of exsiccata have proved to be particularly interesting both because of the documentation of the techniques of preparation and of the reconstruction of Cupani’s role in the botanical culture of his time. They were discovered by chance in 1992, attributed to Cupani (Brullo & Pavone 1993) but only studied in 2014 (Pulvirenti, Indriolo, et al. 2015b).

The two volumes, which are characterized by striking structural and substantial differences (Table I), do not reveal the period of realization, but are related to the activity of the Sicilian botanist for the reasons outlined below.
On the basis of a more careful analysis we must begin by stating that the herbarium which has already been studied (VII F2) was attributed to Cupani mainly on the grounds of bibliographical data (Scinà 1824; Portal 1836), since the handwriting does not coincide with that of the manuscripts (to be found in the Municipal Library of Palermo) which are certainly to be attributed to the same Author (Cupani 1696; Di Marzo 1934). These documents were made available for consultation only after the publication of the related paper (Pulvirenti, Indriolo, et al. 2015b).

The herbarium which is the object of this study (VII F1), on the other hand, although it was compiled by an unknown person, has the nomenclature which was enriched and/or corrected by Cupani, as one of the handwriting specimens present, as will became clear later (see Results), is without doubt his.

Apart from the specific attribution however, we can find significant links with the activity of the Franciscan friar.

In the first place there are explicit references to Cupani in the spines of the two volumes (VII F1
“Hortus Siccus Plantarum P. Francisci Cupani Autographus” and VII F2 “Cupani Hortus Siccus”), even if the inscriptions cannot be considered original, but were certainly recopied in a later age.

Furthermore, the acquisition documents in the possession of the Department of Biological, Geological and Environmental Sciences allow us to reconstruct, at least in part, the last changes of ownership:

- **herbarium** VII F1 was entrusted in 1912 by the Royal University Library of Catania to the (then) Botanical Institute in the hands of the Director, Professor Luigi Buscalioni. As is evident from the document attesting the delivery dated 18 December 1912, he had made a formal application on 20 November 1912. The Minister of Education on 14 December 1912, in answer to the favorable
Table I. Comparison between Herbaria VII F1 and VII F2.

|                        | VII F1                                      | VII F2                                      |
|------------------------|---------------------------------------------|---------------------------------------------|
| Repository             | Catania University                          | Catania University                          |
| Period of realization  | Probably 1600                              | Late 1600                                  |
| Rearrangements         | Few (skin folder and additional number in pencil) | Few (later binding and notes written in pencil) |
| Bookbinding            | A single volume, with currently 186 (originally 190) pages | A single volume, with 164 pages |
| Size                   | Smaller (8 × 11 inches)                     | Bigger (11 × 16 inches)                     |
| Title page             | Missing                                     | Present, but almost certainly not original 19 pages in folio |
| Index at the end of the volume | 5 duplex pages                              |                                             |
| Mounting method of samples | Fixed by a double hole or sewn using needle and thread | Fixed by strips of paper and glue |
| Total number of specimens | 439 (386 angiosperms, 4 pteridophytes, 1 gymnosperm and 48 missing specimens) | 669 (610 angiosperms, 14 pteridophytes, 9 algae, 5 gymnosperms, 4 marine animals, 1 lichen and 26 missing specimens) |
| Specimens on each sheet | 1–9                                        | 1–12                                       |
| Nomenclature           | Latin polynomial (few words), sometimes the Greek name and, often, the vernacular name | Latin polynomial (few words) and, sometimes, the vernacular name |
| Calligraphy            | Two different handwritings, one certainly of Cupani and the other unknown | Only one unknown handwriting |
| On-line access         | Not available                               | http://www.dipbot.unict.it/herbario/cupani/index.html |

judgment of the Director of the Library (letter of 23 November 1912), had authorized “the transfer to the Royal Botanical Institute of the Cupani Herbarium”. Professor Buscalioni declares that the volume known by the title “Cupani hortus siccus, manuscript no. 20” had a mainly historical value and little scientific value; for this reason it was bought for only “one hundred lire”. The history of Giambattista Caruso’s library allows us to reconstruct the transfer of this volume of exsiccata from Palermo to the Royal University Library of Catania. The material belonging to Cupani, who died in Palermo in 1710, had been kept by his “patron”. The Prince of Cattolica entrusted the work of collation and selection of the materials to G.Caruso, an erudite Palermitan of that period, who belonged to the group of scholars close to him. Caruso, who in all probability frequently visited the Sicilian botanist, because he lived not far from the “Palazzo Cattolica” and the adjacent Saint Anne’s Convent (the residence of the Franciscan friar), kept few things for himself; among these there was the volume of exsiccata (Scinà 1824). The remaining material was handed over to Antonio Bonanno to continue the compilation of Panphyton Siculum (Cupani’s unfinished work) and, after the death of the latter, to his relatives, the Chiarellis (Costa et al. 2016). Caruso’s library was acquired by Catania University, transferred there in the first half of the eighteenth century and opened to the public in 1755 thanks to Abbot Vito Amico. The herbarium was hidden for more than a century among the books until someone noticed that the book in question was a collection of dry plants and decided to allocate it to what was then the Botanical Institute.

- herbarium VII F2 was acquired by Professor Emilio Chiovenda, Director of the (then) Botanical Institute on 9 March 1927 at the Tirelli bookshop in Catania. As can be deduced from the autograph notation of Chiovenda on the page preceding the title page, the volume of exsiccata had belonged to Salvatore Portal, a physician-botanist from Biancavilla (near Catania). Portal had inherited it from his father who, in turn, had bought it from Giuseppe Chiarelli, a chemist in Palermo. It is not known how the herbarium passed from Portal to the Tirelli bookshop, which sold it afterwards to Prof. Chiovenda (Portal 1836; Pulvirenti, Indriolo, et al. 2015b).

The chain of transfers thus appears to be quite complete and convincing.

Methodology

A list of all specimens associated with Cupani’s historical herbarium VII F 1 was prepared (Supplementary Table I), including for each sample the following information:

1. number of the herbarium sheet under which the sample is currently placed;
2. literal transcription of original name proposed in the herbarium (polylogus/polynomial written in Greek, Latin and vernacular); the names which were deleted have not been mentioned. The absence of the name is indicated by “/”, any illegible writing by “?” and the fact that the name noted was transcribed from the index at the end of the volume of exsiccata by “index”. In addition, since the polynomial was clearly
written by two people (the handwriting and the ink are completely different) the part of the *Polygonum* connected with the handwriting which is not considered to be that of Cupani is in bold print;

(3) current taxonomic identification. We have followed treatments such as Euro+Med (2016) and partially Giardina et al. (2007) and Pignatti (1982). Thus the absence of a scientific name is indicated by “/”, when we were unable to identify;

(4) state of preservation of the specimen according to three categories: bad (if there are only plant fragments), poor (if the sample is damaged) and good (if the sample displays all its parts). A missing sample is also indicated.

A list of alphabetically arranged taxa is presented (Appendix 1); this list includes the plants of the herbarium that we studied and that we were able to identify.
Finally, this *herbarium* (VII F1) is compared with the other (VII F2) in order to highlight their main similarities and differences (Table I).

**Results**

Volume VII F1 is made up of various files joined in a single block by a binding, which is certainly original (they were sewn using needle and thread) and contained in a leather folder of a later age; on the spine of this folder we find the following inscription: “Hortus Siccus Plantarum P: Francisci Cupani Autographus”. This inscription was probably once the now missing title page. On the cover we find two inventory numbers: that of the University Library (no. 20) and that of the Botanical Institute (VII F1 *Hortus Botanicus Catinensis*).
They do not correspond with those placed later by an unknown hand (next to the original ones) because of the lack of the first four sheets (Figure 3).

On every sheet there are between 1 and 9 specimens, depending on the dimensions of the sample (Figures 4 and 5).

The samples are covered with a whitish dust (probably DDT) as a consequence of a disinfection treatment of uncertain date (perhaps going back to the sixties when all the herbarium material present in the (then) Botanical Institute was sterilized.)
The plants are nearly always on one side only of the sheet, but in nine cases (sheets no. 35, no. 48, no. 51, no. 68, no. 73, no. 126, no. 140, no. 165, no. 171) the samples are placed on both sides; in which case we numbered the sheet with the same number plus “bis”.

As far as the mounting method is concerned, the specimens are fixed by a double hole or sewn using needle and thread.

Some specimens were attached onto “recycled paper”, that is with written sentences, but without any references to the specimens present, also because in some cases the sheet is upside down (sheets no. 109, no. 110, no. 125, no. 126).

From the point of view of the nomenclature, we always find, under or next to each specimen, the polylogus in Latin and, frequently, the vernacular name. On some sheets (no. 7, no. 9, no. 11, no. 14, no. 27, no. 29, no. 31, no. 34, no. 36, no. 39, no. 41, no. 82, no. 84, no. 85, no. 86, no. 87, no. 88, no. 101) we also find the name in Greek (Figure 2). The name of the plant, often, is deleted and replaced by another one.

The handwriting is different from that of the other volume (VII F2); in particular, in this volume we find two types of writing, which are different, both from the point of view of the handwriting and from the ink that was used. The first (in bold type in Supplementary Table I) is the same as that of the index. It refers to the original denomination of the specimens and cannot, at present, be attributed to any known person; in this case the names of the plants are written in a more synthetic way and with reference only to a limited number of authors, who are earlier than those mentioned by Cupani. The second handwriting, on the other hand, can be attributed to Cupani, as is clear from the comparison with the autograph manuscripts of 1696 in the possession of the Municipal Library of Palermo (Cupani 1696; Di Marzo 1934). The corrections and additions would seem, therefore, to be in his own hand (Figure 6); either only the author or also the name of the plant; in the second case the polylogus is made up of a larger number of words and more authors are quoted; the way authors’ names are shortened is also different. It would seem, therefore, that Cupani reviewed the
herbarium, integrating and/or correcting the nomenclature.

The herbarium is made up of 439 specimens. By excluding missing samples (48, equal to 10.93%) the others are distributed as follows: 386 (87.93%) are angiosperms, 4 (0.91%) are pteridophytes, 1 (0.23%) is gymnosperm.

The identification of the specimens was, often, difficult, because in most cases it was a question of isolated parts of the plants (for example only a leaf) or because the sample was damaged; however it was possible to identify most of them (Appendix 1 and Supplementary Table I).

Most samples (200, equal to 45.56%) are in a good state of conservation, 142 (32.35%) in a poor state, 49 (11.16%) in bad condition, and 48 (10.93%) are missing (Supplementary Table I).

Conclusions

The herbarium which is the object of this study is in a reasonable state of conservation, in spite of the events that have marked its history and which, unfortunately, have eliminated the references to chronology and attribution, even if the changes of ownership after Cupani’s death are well known.

This volume of exsiccate seems to have been “reviewed” by the Sicilian botanist, as can be gathered from the numerous corrections and/or integrations in his own hand. We can conjecture that this was done previous to Cupani’s scientific activity on the basis of a number of considerations. In the first place, the polylogus was not modified in the case of specimens which were missing or had been broken up into pieces so small as to make identification impossible: this could mean that the samples had already deteriorated at the time of the “reviewing” on the part of the Franciscan friar. Furthermore on sheet 119, next to a specimen we only find the original denomination plus (in Cupani’s handwriting) a sentence in Latin “nescio quid sit” (I don’t know what it’s about). Lastly, while it is not possible to consider it conclusive, on page 91 we find a small sheet, dated 1º September 1575, with an incomprehensible sentence. Further studies in this direction are still under way.

We can, therefore, imagine that the herbarium was produced by an unknown person and that, only later, did the Franciscan botanist review it. Moreover this coincides with the hypothesis that at Misilmeri there was a sort of laboratory for the production of herbaria. The exsiccate was probably produced by several people (often apothecaries) who worked under the supervision of Cupani (Pulvirenti, Indriolo, et al. 2015b).

The presence of numerous denominations in Greek could be a sign that the herbarium was produced by a person who was fluent in that language, with which learned men were familiar. It was also widespread in the Greek speaking zone near Palermo and Misilmeri as well as the zone of the Nebrodi (Mirto, Frazzanò, Longi) in which Cupani was born.

As can be deduced from the comparison, the two herbaria (VII F1 and VII F) reveal important differences of structure (for example the dimension of the two volumes and the mounting method of the specimens) and of substance (for example, the number of samples and the taxa present). In spite of the larger number of sheets the herbarium which we studied contains a smaller number of specimens (230) in comparison with the one previously examined, given the larger dimension of the latter (Table I).

In this case too there is a prevalence of angiosperms (more than 380 taxa), which are very well represented according to their species number. Also in this herbarium in addition to many specimens of Sicilian origin, a certain number are from other geographic regions and some are also exotic, probably deriving from exchanged seeds.

Moreover from the comparison we can infer that in volume VII F1 we do not find seaweeds, lichens, and marine animals (present, albeit in a limited quantity, in the other one) and that 74 taxa are common to both herbaria.

As is well known, historical herbaria contribute considerably to the diachronic analysis of biodiversity (Blasi, Biondi, et al. 2011; Blasi, Marignani, et al. 2011; Danin et al. 2014) and to floristic, taxonomic and nomenclatural studies too (Celesti-Grapow et al. 2013; Mazzola et al. 2014; Pimenov & Sutorý 2014; Iamonico & Managlia 2015; Iberite et al. 2015). In particular, the herbarium, which is the subject of our study, is historically interesting from the viewpoint of nomenclature and the floristic biodiversity of the pre-Linnaean period. The greatest value of this volume of exsiccate is the fact that it (just as the other) has undergone very few rearrangements, compared with other pre-Linnaean herbaria, especially since most them have been widely restored and/or increased in later periods.

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Supplemental data

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Appendix 1. Taxonomic index of the species present in the studied herbarium

*Acanthus spinosus* L.

*Acílica ageratum* L.

*Acílica millefolium* L.

*Acorus calamus* L.

*Adonis* sp.

*Aegonchon purpurocaeruleum* (L.) Holub

*Acítha cynthia* L.

*Agrimonia eupatoria* L.

*Aluga reptans* L.

*Alchemilla vulgaris* L. s.l.

*Allium carinatum* subsp. *pulchellum* (G. Don) Bonnier & Layens

*Allium neapolitanum* Cirillo

*Allium ursinum* L.

*Allthaea officinalis* L.

*Amaranthus caudatus* L.

*Ambrosia maritima* L.

*Anemone* ssp. *Guss.*

*Anthemis graveolens* L.

*Antirrhinum majus* L.

*Aquilegia vicsca* Gouan

*Arabis turrita* L.

*Aristolochia clematitis* L.

*Armoracia rusticana* P. Gaertn., B. Mey. & Scherb.

*Artemisia abrotanum* L.

*Artemisia absinthium* L.

*Armoracia rusticana* P. Gaertn., B. Mey. & Scherb.

*Artémisía alba* L.

*Artémisía absinthium* L.

*Artémisía alba* L.

*Artémisía alba* Turra

*Artemisíá sp.*

*Asphodeline lutea* (L.) Rchb.

*Asphodelus* sp.

*Asphodelus* sp.

*Astonium scpolendium* L.

*Aster tripolidium* L.

*Astrantia major* L.

*Atriplex patula* L. var. *angustifolia* Sm.

*Aurinia leucadea* (Guss.) K. Koch

*Baebon macedonicum* L.

*Balacone nigro* L.

*Balacone pseudodactyham* (L.) Benth.

*Berberis vulgaris* L.

*Bituminaria bituminosa* (L.) C. H. Stirt.

*Borago officinalis* L.

*Bryonia cretica* subsp. *dioica* (Jacq.) Tutin

*Bubon macedonicum* L.

*Butelion rotondolifon* L.

*Butelion rotondolifon* L.

*Calendula arvensis* L.

*Calystegia soldanella* (L.) Roem. & Schult.

*Camelina sativa* (L.) Crantz

*Cannabi sativa* L.

*Capsella rubella* Reuter

*Cardex sp.

*Carline sp.

*Carthamus tinctorius* L.

*Carum carvi* L.

*Centarum cineraria* L.

*Centarum benedicta* (L.) L.

*Centarum caf. *babyloonica* (L.) L.

*Centarum sp.

*Cercis silquastrum* L.

*Chaerophillum temulum* L.

*Chelidonium majus* L.

*Chenopodium vulvaria* L.

*Cichorium intybus* L.

*Cionura erecta* (L.) Griseb

*Cirsium eriocarpum* L. Griseb

*Cirrus sp.

*Cirrus sp.

*Cistus incamus* L.

*Cistus sp.

*Clematis flammula* L.

*Clematis recta* L.

*Clinopodium grandiforium* (L.) Kuntze

*Coleostephus mycosis* L.

*Colutea arborescent* L.

*Comsinda ajaciti* (L.) Schur

*Convallaria majali* L.

*Convolvulus arvensis* L.

*Corydium sativum* L.

*Corynus sanguinea* L.

*Coronilla scorpioides* (L.) W.D.J. Koch

*Cota setalitis* (Tam.) Holub

*Crataegus monogyna* L.

*Crataegus ribidophylla* Gand.

*Cynodon oblonga* Mill.

*Cyperus longus* L.

*Daucus carota* L.

*Descurainia sophia* (L.) Prantl

*Diathia cf. *armeria* L.

*Diathia cf. *barbatas* L.

*Digitalis lutea* L.

*Diospyros lotus* L.

*Diospyros fullonum* L.

*Diospyros palus* L.

*Dorycnium hisquam* (L.) Ser.

*Dracunculus vulgaris* Schott

*Drysopteris fílis-mas* (L.) Schott

*Dyssphania botrys* (L.) Mosyakh & Clements

*Ecballium elaterium* (L.) A. Rich.

*Echium carota* L.

*Echium vulgaris* L.

*Epilobiun montanum* L.

*Epilobiun sp.

*Epilobiun sp.

*Epilobiun lotea* L.

*Epilobiun fullonum* L.

*Epilobiun palus* L.

*Epilobiun hiorum* (L.) Ser.

*Euphorbia amygdaloideas* L.

*Euphorbia amygdaloidis* L.

*Euphorbia dulcis* L.

*Euphorbia lathyra* L.

*Euphorbia nicaeensis* All.

*Euphorbia peplus* L.

*Euphorbia pityusa* subsp. *cupani* (Guss. ex Bertol.) Radcl.-Sm.

*Euphorbia sp.

*Fagopyrum tataricum* (L.) Gaertn

*Ferula communis* L.

*Ferulago campesris* (Besser) Grecescu

*Filipendula vulgaris* Moench

*Foeniculum vulgare* Mill.

*Fraxinus ornus* L.

*Fritillaria cf. persica* L.

*Fumaria* ssp.

*Galactites tomentosa* Moench

*Galatela linoxrus* (L.) Rechb. f.

*Galega officinalis* L.

*Galium verum* L.

*Genista tinctoria* L.

*Geranium dissectum* L.

*Geranium macrorrhizum* L.

*Geranium sanguineum* L.

*Geranium tuberosum* L.

*Graum urbanum* L.

*Glúcum flumum* Crantz

*Glycyrrhiza glabra* L.

*Halimione portulacoides* (L.) Aellen

*Helianthemum nummularium* Mill.

*Heléborus niger* L.

*Heléborus viridis* L.

*Hepatica nobilis* Mill.

*Heracleum spondylium* L. subsp. *pyrenaicum* (Lam.) Bonnier & Layens

*Heracleum spondylium* L. subsp. *spondylium*

*Hesperis matronalis* L.

*Hippopérepsis emerus* (L.) Lassen subsp. *emerus*

*Hypericum androsaemum* L.

*Hypericum perforatum* L.

*Ilex aquifolium* L.

*Impatiens balsamina* L.

*Inda conyzae* (Gries.) DC.

*Iris foetidissima* L.

*Istra tinctoria* L.

*Jacobae maritima* subsp. *bicolor* (Willd.) B. Nord. & Greuter

*Juniperus communis* L.

*Kickxia spuria* (L.) Dumort.

*Knautia integrifola* Bertol.

*Lactuca virosa* L.

*Laphangium luteoalbum* (L.) Tzvelev

*Laspeutrum latifolium* L.

*Laspeutrum sifer* L.

*Lathyris niger* (L.) Bernh.

*Lathyris sylvestris* L.

*Lathyris sylvestris* L.

*Lepidium comos* (L.) Bonnier & Layens

*Lepidium pyrenaicum* subsp. *cupani* (Guss. ex Bertol.) Radcl.-Sm.

*Lepidium sp.

*Lévisticum officinale* W.D.J. Koch

*Ligusticum vulgar* L.

*Lípospermum officinale* L.

*Lonicera eurstä Santi

*Lonicera interplea* Aiton
Lychnis coronaria (L.) Desr.
LYcopus europaeus L.
Lysimachia vulgaris L.
Lythrum salicaria L.
Mailea neoglia Wallr.
Malva cf. syvæstris L.
Mandragora autumnalis Bertol.
Marrubium vulgare L.
Medicago polymorpha L.
Medicago lupulina L. subsp. lupulina
Medicago lupulina L. susp. Cupaniana (G.) Nyman
Medicago sativa L.
Melilotus italicus (L.) Lam.
Melissa officinalis L.
Melitis melissophyllum subsp. albida (Guss.) P. W. Ball
Mentha pulegium L.
Mercurialis annua L.
Melocactus laevis L.
Myrtus communis subsp. tarentina (L.) Nyman
Nerium oleander L.
Nigella arvensis L.
Nigella damascena L.
Ononis spinosa L. subsp. hircina (Jacq.) Gams
Origanum majorana L.
Origanum vulgare L.
Osmunda regalis L.
Paeonia officinalis L.
Palenmis spinosa (L.) Cass.
Papaver rhoas L.
Papaver somniferum L.
Parietaria judaica L.
Pastinaca sativa L.
Pentaglottis sempervirens (L.) H. Bailey
Peucedanum officinale L.
Peucedanum oreoselinum (L.) Moench
Peucedanum ostruthium (L.) W. D. J. Koch
Peucedanum sp.
Phlomis fruticosa L.
Phlomis herba-viei L.
cf. Physalis L.
Pilosella officinarum Vaill.
Pimpinella anisum L.
Pimpinella saxifraga L.
Pimpinella sp.
Plantago afric L.
Plantago major L.
Polycarpon tetraphyllum subsp. alsinifolium (Biv.) Ball
Populus alba L.
Potentilla alba L.
Potentilla argentea L.
Potentilla cf. detommasii Ten.
Potentilla erecta (L.) Räusch.
Potentilla reptans L.
Potentilla cf. rapaestris L.
Potentilla sp.
Prangos ferulacea (L.) Lindl.
Prunus armeniaca L.
Prunus mahaleb L.
Pulsatilla vulgaris Mill.
Raphanus sativus L.
Ruscus cf. Thapsia L.
Thlaspi aliaceum L.
Thlaspi cf. arvense L.
Thymus serpyllum L.
Thymus stiatiatus Vahl
Tolulis nodosa (L.) Gaertn.
Tragopogon dubius Scop.
Trifolium rubens L.
Trifolium sp.
Trigonella foenum-gracecum L.
Tussilago farfara L.
Valeriana officinalis L.
Valeriana phu L.
Verbascum blattaria L.
Verbascum sp.
Vincetoxicum hirundinaria Medic.
Viola odorata L.
Santolina chamaecyparissus L.
Saponaria cf. ocymonides L.
Saponaria cf. ocymonides L.
Saponaria officinalis L.
Satureja hortensis L.
Scabiosa cf. columbaria L.
Scytonmus hispanicus L.
Scrophularia canina
Scrophularia nodosa L.
Securigera secundaca (L.) Degen & Dörfl.
Sedum cepa L.
Senecio doria L.
Silene sp.
Silene vulgaris (Moench) Garcke
Silybum marianum (L.) Gaertn.
Sion ammonium L.
Sisymbrium officinale (L.) Scop.
Sisymbrium sp.
Sium cf. siarson L.
Sium cf. siarson L.
Smilax aspera L.
Smyrnium olusatrum L.
Solenanthus apenninus (L.) Fisch & C. A. Mey.
Solidago virgaurea L.
Sonchus asper (L.) Hill
Sonchus oleraceus L.
Sorbus domestica L.
Sparrtium junceum L.
Spinacia oleriacea L.
Stachys officinalis (L.) Trevis.
Stachys recta L.
Stachys sp.
Staphylea pinnata L.
Symphymum tuberosum L.
Syringa vulgaris L.
Tamus communis L.
Tanacetum balsamita L.
Tanacetum parthenium (L.) Sch. Bip.
Tanacetum vulgare L.
Teucrium chamaedrys L.
Teucrium flavum L.
Teucrium scordium L.
Teucrium scorodonia L.
Thalictrum lucidum L.
Thalictrum sp.