



FA1203: Sustainable management of *Ambrosia artemisiifolia* in Europe (SMARTER)

Short Term Scientific Mission Report

A morphological study to make an *Ambrosia* determination key for Europe

STSM details

COST STSM Reference Number: COST-STSM-ECOST-STSM-FA1203-070415-059092

Timing of STSM: 07-04-2015 to 18-04-2015

Applicant details

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Host details

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Summary of the STSM

The STSM aimed at improving the knowledge about the morphology of *Ambrosia* species growing in Europe. The work is based on herbarium collections of European herbaria that inhabit huge collections of dried specimens. The collections in the Royal Botanical Gardens in Kew (London) and at the University La Sapienza in Rome were selected to provide important input. The outcome is a renewed description of the *Ambrosia* species in Europe. This STSM contributes to a collaborative activity of WG 2, WG 3 and WG4 to provide good descriptions and an elaborated determination key. The work took place from 7.4. to 18.4.2015 basically in London (UK), and additionally in Roma.

Purpose of the STSM

1. Checking and reviewing all the specimens of the selected taxa in the herbaria based on the given descriptions in the literature.
2. Documenting all the findings of specimens other than the widespread *Ambrosia artemisiifolia*
3. Producing maps of the European distribution of *Ambrosia* species other than *A. artemisiifolia*.
4. Comparing and documenting morphological characters of all species to come up with a morphological table to be discussed in the taxonomy group of the SMARTER action.

5. Strengthen the collaboration between the WGs of SMARTER, i.e. of WG 2, WG 3 and WG 4.

Description of the work carried out during the STSM

- a. The Royal Botanical Garden accepted my application to review all the specimens of *Ambrosia* in their big herbarium, a collection of more than 7 mio sheets. The head of the Institution organized for me a full working place with microscope and imaging utilities. Mrs. Sally Dawson introduced me to the use of facilities and provided help whenever there was a need.
- b. In the Mediterranean several herbaria are interesting i.e. with respect to the assumed native *A. maritima*. Its recent distribution is not known except for some sectors of the area. Old findings of correctly determined specimens can be checked for actuality. The herbarium of the La Sapienza University in Roma is medium sized (ca. 1 mio sheets) but rich in *A. maritima* specimens. I appreciated very much the offer of a working place with microscope for 3 days by Prof. Giovanna Abbate.
- c. The visit to Kew Gardens started on Tuesday 7th of April and lasted until Saturday 11th of April 2015. The journey to Roma was performed between 15th and 18th of April 2015. In between the two visits the data/slides were sorted to be implemented in a database about characters and distribution.

Description of the main activities and results obtained

Reviewing ca. 1200 specimens of *Ambrosia*:

During the STSM, I analysed the whole herbarium samples in Kew Gardens and University of Roma considering all *Ambrosia* specimens collected outside North America (invasive range). My focus was on the following taxa:

Ambrosia artemisiifolia, (= *A. elatior*),

A. confertiflora,

A. maritima (= *A. senegalensis*; assumed native Old-World species),

A. psilostachya (= *A. coronopifolia*),

A. tenuifolia and

A. trifida.

For comparison also several specimens from North America were reviewed. The majority of specimens turned out to be identified correctly, few had to be renamed by me. Most misidentifications happened in mixing up *A. psilostachya* on the one hand, and *A. maritima* and *A. artemisiifolia* on the other hand. A serious mistake was the misidentification of a taxon new to Europe (*A. cf. tomentosa*).

Morphological analysis:

Some characters that are used in the literature to determine the European invasive species and the 'native' *A. maritima* are not correct. I.e., in the *Flora Europea* (Tutin et al. 1978), even the life form used for key construction is wrong. *A. psilostachya* is clearly a root sprouting perennial but called 'annual' by the authors. *A. maritima* is called annual, biennial or perennial depending on the *Flora* used.. This is very suspicious! The cause is that many specimens were collected without basal parts of the plants (roots) and therefore even the descriptions were wrong. To apologize the determinators, this mistake can happen if you

look only on herbarium material. Additionally, the North American monographs and determination keys provide no information about this character. It can only be seriously decided upon field observations or extensively uprooted specimens.

Still problematic is the morphological distinction between *A. maritima* from the Mediterranean region and specimens from tropical Africa. The latter are often named *A. senegalensis* that looks like mesophilous *A. maritima*. This has to be clarified by phylogenetic analysis.

Distribution data:

The thermophile genus *Ambrosia* is represented with all species in the Mediterranean region: *A. artemisiifolia* is rare there and only distributed in the northern part of the Mediterranean region (near to the Adriatic coast and Southern France Coastline).

A. maritima: was documented from about 25 different places (sandy coastal areas) throughout the whole Mediterranean basin. But, more recent specimens are absent! Therefore the question rose if all those old findings still are represented by actual populations. This has to be clarified in the field. *Maritima*-like specimens were also documented from the dryer parts of Africa south of the Sahara and towards East and Southeast Africa.

A. psilostachya is scattered also around the whole Mediterranean basin; more frequently to the western Mediterranean. It is furthermore documented from Australia, China, South Africa.

A. tenuifolia has some rare populations around the Mediterranean basin but also in South Africa, Mauritius and Madagaskar.

A. trifida is rarely collected and few specimens were found in the collections.

The morphological features of the species given in floras turned out to fit with few mistakes (plant longevity) and some corrections considering their variability.

Further use of data within SMARTER

The lack of correct and user-friendly determination keys led to many misidentifications of Ragweed species in Europe and worldwide. SMARTER members from WG 2, 3 and 4 joined to improve this situation. This STSM will provide essential data to develop a correct determination key, because G. Karrer is essential part of this taxonomy group.

Foreseen publications/articles resulting from the STSM

The results integrated into the taxonomy group will enrich the expected paper and leaflets produced by this group.

Confirmation by the host institution of the successful execution of the STSM

Copy of the e-mail sent to Dr. Maurizio Vurro, the Training Coordinator of the COST Action FA1203, is to find attached.

Vienna, 20.05.2015

Gerhard Karrer