Saproxylic syrphids in Mediterranean ecosystems(Diptera, Syrphidae)

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Saproxylic organisms

"…….. are those dependent at some stage during their life cycle, on dead wood or decaying material associated with the woody parts of trees" (Rotheray *et al*., 2001).

Phytotelmata

(*Phyton*=plant, *telmatos*=reservoir). Water in some sort of container in different parts or structures of the vegetal, such us tree holes (Ludwig Varga, 1928).

- *Poorly known* in Mediterranean ecosystems and due to their apparent *particularity*, they are likely to be of high interest for rare species.

-The organisms found in phytotelmata can be *indicators of the degree of maturity and conservation value* of Mediterranean forest.

Importance of the study

Council of Europe's Committee of Ministers Recommendation Nº R (88) 10 → Protect saproxilic organisms and their biotopes → Red-List

Coleoptera

Osmoderma eremita

Syrphidae: *Blera fallax* *Hammerschmidtia ferruginea*

Objectives

a) To study the life cycle and *immature stages morphology*

b) To know the *breeding sites and microhabitats of saproxylic syrphids* in the Mediterranean forest.

c) To establish *the relationship* between syrphids and breeding sites or species tree.

d) Work out implications in the *conservation and management* of these ecosystems.

Mallota spp. larva

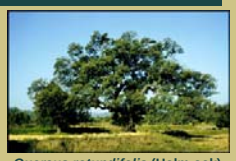
Area Studied

Name: Cabañeros National Park, Ciudad Real - Toledo, Spain in 1995.
Extension : 39.000 ha
Location: 0º 35' O; 39º 24' N

Cabañeros National Park

Tree species

Evergreen



Quercus rotundifolia (Holm oak)

Quercus suber (Cornk oak)

Deciduous

Quercus pyrenaica (Sessile oak)

Quercus faginea (Quejigo)

Fraxinus angustifolius (Fresno)

Presentation given at the 3rd Syrphidae Symposium,
Leiden, The Netherlands, 2nd to 5th September, 2005

Methodology: Field work

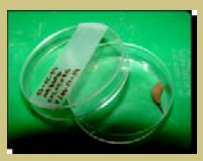
1. Every *month* (March- October)
2. Looking and taking immature stages of saproxylic syrphids
3. Recording:
   a) Species and diameter of the tree
   b) Microhabitat type (tree hole, decaying tree roots, sap exudation, etc.)
   c) Characteristics of the microhabitat: orientation, height, size, shape, depth, moisture condition.

Methodology: Rearing larvae

- Larvae with small amounts of extracted material were placed in (10 X 5 cm) plastic boxes.

- Growth chamber

T: 16-22ºC
Hr: 85%
15L: 9D



- Pupae in Petri dish: 5 cm Ø

Results: a) To study the life cycle, immature stages and morphology

- First data for the life cycle and larval morphology of 5 species

Spilomyia digitata

Ceriana vespiformis

Callicera macquartii

Micron, 2005 *(in press)*

- Two Mediterranean endemics: *Mallota dusmeti* and *Myolepta difformis* *(in prep.)*

Mallota dusmeti

VULNERABLE (VU)

Myolepta difformis

Results: b) To understand the breeding sites and microhabitats of saproxylic syrphids of the Mediterranean forest.

- 79 reared specimens of 7 genera and 9 species: *Callicera aurata, C. macquartii, C. spinolae, Ceriana vespiformis, Ferdinandea cuprea, Mallota dusmeti, Myathropa florea, Myolepta difformis* and *Spilomyia digitata*.
- 6 genera and 8 species in tree holes and 1 species in sap exudation

TREE HOLES
100% specimens

- *Callicera aurata*
- *Callicera macquartii*
- *Callicera spinolae*
- *Ceriana vespiformis*
- *Mallota dusmeti*
- *Myatropa florea*
- *Myolepta difformis*
- *Spilomyia digitata*

SAP EXUDATIONS
100% specimens

- *Ferdinandea cuprea* (1,25 m high)

Results: b) To know the breeding sites and microhabitats of saproxilic syrphids of the Mediterranean ecosystems.

1,5-3 m
- ***Callicera macquartii* (100%)**
- ***Mallota dusmeti* (100%)**
- ***Myolepta difformis* (100%)**
- *Callicera spinolae* (53,8%)
- *Myatropa florea* (39,29%)

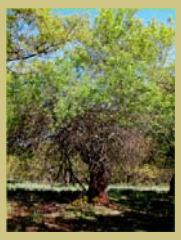
0-1,5 m
- *Ferdinandea cuprea* (100%)
- *Callicera aurata* (42,8%)
- *Callicera spinolae* (46,15)
- *Myatropa florea* (50%)

Roots
- *Ceriana vespiformis* (100%)
- *Spilomyia digitata* (100%)
- *Callicera aurata* (14,3%)
- *Myatropa florea* (10,71%)

Results: c) To establish the relationship between syrphids and species tree

Syrphid	Known Tree Species
Mallota spp.	
Maier, 1978	*Carya spp.*, *Liquidambar styraciflua*, *Populus deltoides*, *Quercus alba, Q.marilandica*, *Quercus velutina*, *Ulmus*
Maier, 1982	*Pyrus malus*
Martin H., 1996	*Acer, Aesculus, Fagus*, *Populus, Ulmus*
Dussaix, 1997	*Fagus*, *Quercus*
Rotheray, 2001	*Fagus sylvatica*
Barr,1996	*Aesculus*

New Tree Species



Fraxinus angustifolius

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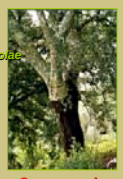
Results: c) To establish the relationship between syrphids and species tree

Syrphid	Known Tree Species	New Tree Species
Callicera spp.		
Dussaix, 1997	*Fagus*, *Quercus*	
Mac Gowan, 1994	*Larix decidua*	
Rotheray & Mac. Gowan, 2000	*Pinus sylvestris*, *Picea abies*	

C. macquartii
C. aurata
Quercus rotundifolia



C. spinolae
Quercus suber

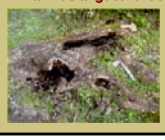
C. spinolae
C. aurata
Quercus faginea

Fraxinus angustifolius

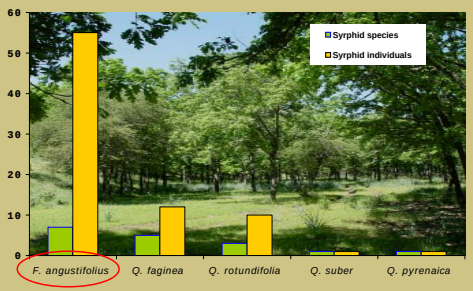
Results: c) To establish the relationship between syrphids and species tree

Syrphid	Known Tree Species	New Tree Species
Myolepta spp.		
Speight, 2003	*Populus italica*, *Acer*	
Dussaix, 1997	*Fagus*, *Quercus*	
Spilomyia spp.		
Jeroen van Steenis, 2000 (Huggert com. pers.)	*Acer platanoides* (pupae)	
Myathropa florea		
Dussaix, 1997	*Fagus*, *Quercus*	
Speight, 2003	*Betula*, *Fagus*, *Quercus*	
Ceriana spp.	*Any previous rearing data of Palaearctic species*	

Fraxinus angustifolius



Results: c) To establish the relationship between syrphids and species tree



F. angustifolius	*Q. faginea*	*Q. rotundifolia*	*Q. suber*	*Q. pyrenaica*
M. florea	*M. florea*	*M. florea*		*F. cuprea*
M. dusmeti	*M. dusmeti*			
C. aurata	*C. aurata*	*C. aurata*		
C. spinolae	*C. spinolae*		*C. spinolae*	
M. difformis	*M. difformis*	*C. macquartii*		
C. vespiformis				
S. digitata				

Results: d) Implications in the conservation and management of these ecosystems.

Project developed by **CIBIO** in collaboration to **AeE** and **SEM**

Mallota dusmeti Andreu,1926

VULNERABLE (VU)

Pupal spiracle

Recommendations:

Management that is sympathetic to the needs of phytotelmata and their dependent syrphids in Mediterranean forest is required.

1- Preserve trees with holes, sap exudations and decaying roots.

2- Encourage the survival of mature trees

Conclusions

- Nine saproxylic Syrphid species were reared, eight species of 6 genera in **tree holes** and **one in exuding sap**. The immature stages of **five species have been described for the first time** and breeding requirements understood for all species reared.

- To conserve saproxylic syrphids in Spain, emphasis should be given to **mature examples of tree** such us *Fraxinus angustifolius* and *Quercus* species.

- Few saproxilic syrphid species seem to be specific to tree species, exceptions were *Ceriana vespiformis* and *Spilomyia digitata* associated with **wet roots of *Fraxinus anguxtifolius***.

- Our rearing data on *Mallota dusmetii* have been a useful tool for this species to be considered as **VULNERABLE** in the Invertebrate Spanish Red Book. This fact will help to conserve other endangered species breading in the same habitats.

- Rare and iberian endemic species living in tree holes like *Spilomyia digitata* and *Myolepta difformis* are categorized as "**threatened**" species.

Acknowledgements

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