

SOIL BIODIVERSITY IN ITALY

Italy is one of the European Member States where a highest variability of soil types and uses can be found. From the Top of the Alps to the African shelf islands of Sicilian channels, throughout a vast gradient of climates and habitats, including volcanoes and small islands, but also ancient sites and anthropically modified environments, there is a broadly recognized scientific interest (and acknowledged naturalistic value) in Italian soils.

Although soil biodiversity is one of the least studied aspects of soil, it is life itself that contributes in forming and evolving their status. Since the late XIX century, however, soil biodiversity in Italy has been object of intense studies by scientists and students coming from all over the world. The first tentative assessment of soil animals started in Italy, thanks to the researches of Berlese and Canestrini, and from their ancient experiences a new era for soil biology begun, thereby producing in more recent times worldwide soil investigations.

At present, a whole assessment of the entire bulk of life forms, which inhabit Italian soils or use them as a medium to live, is not concluded.

We can be aware of the fact that the Italian plants account more than 6,700 species of vascular plants and 1,130 species of bryophytes.

Nevertheless, thanks to a wide-ranging programme funded by the Italian Ministry of the Environment, also a checklist of all animal species found in Italy has been provided (a web-site is already available for it at the Internet address <http://faunaitalia.it>) and recently updated, with indications on the localisation of over 10,000 of them (<http://www.faunaitalia.it/ckmap/index.html>). This trustworthy work, linked also to the wider Fauna Europea programme (<http://www.faunaeur.org>) and dating at least one dozen of years of tough researches, can now be used to assess an overall value to Italian soil biodiversity.

However, it is evident - from the rate of discovery of new species and the finding of species which are new for the Italian territory – that a large amount part of work still has to be done.

Moreover, another relevant record of Italian fauna is its number of endemic species, almost one fourth of the overall number. This is a rare case in soil fauna, as soil biota tends from its most ancient origins to be widespread and cosmopolitan, yet in Italy this number seems to be increasing with the number of investigations.

Unfortunately, due to the fact that 97% of Italian fauna are invertebrates, the number of protected species is not as relevant as it ought to. Habitat Directive allows protection only to few invertebrate species, mainly big insects, and there is no other legal concern for soil species of incalculable value, performing considerable functions for the whole ecosystem.

Hereby, it is summarised a brief list of animal soil groups and taxa acknowledged and validated within Italian boundaries.

In this account, still inadequate are the total counts of Italian soil microflora (archaea, bacteria, algae and fungi) and microfauna, mainly composed by protozoa (Sarcocystophora: over 1,100 spp.; Apicomplexa: over 220 spp.; Microspora: 13 spp.; Ascetospora: 1 sp.; Myxozoa: 16 spp.; Ciliophora: 430 spp.), nematodes – over 1,300 species, rotifers and tardigrads – almost 250 species each, but including also some polychaeta of humid soils. For these water-linked taxa, it is also quite difficult to assess the real species' habitats.

“Only” Oligochaeta account over 300 species, both terrestrial and marine.

It is also astounding the number of arthropods, if compared with other European countries, which rely for a consistent part of their life cycle on soil, and have to be considered as members of Italian soil fauna. Just to throw a first-glance look to some taxa, and considering in Italy some 6,600 diptera species and the double number of coleoptera, only carabid beetles account for over 1,300 species, ants have almost 230 species, and among more typically soil-inhabiting forms, over 720 species can be found among oribatid mites, while springtails account almost 420 species.

The following table can help understanding the absolute importance for biodiversity of Italian soil invertebrates.

Data to be updated, <http://faunaitalia.it> (2004)

Classes	Orders	Families	Genera	Species
Arachnida	12	351	1,376	4,618
	Scorpiones	1	1	4
	Palpigradi	1	1	9
	Solifugae	1	1	2
	Opiliones	11	43	120
	Pseudoscorpionida	12	43	209
	Araneae	45	323	1,411
	Opilioacarida	1	1	1
	Ixodida	2	22	36
	Gamasida	51	150	580
	Actinedida	88	355	1,160
	Oribatida	93	249	721
	Acaridida	45	187	365
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Symphyla		2	7	19
Paupoda		3	13	43
Chilopoda	4	11	30	155
	Scutigermorpha	1	1	1
	Lithobiomorpha	2	5	82
	Scolopendromorpha	2	4	15
	Geophilomorpha	6	20	57
Diplopoda	8	28	132	473
	Polyxenida	2	3	6
	Glomerida	3	11	61
	Platydesmida	1	2	3
	Polyzoniida	2	2	5
	Callipodida	2	6	8
	Chordeumatida	9	51	149
	Polydesmida	4	16	73
	Julida	5	41	168
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Protura		6	8	31
Diplura		5	21	76
Collembola		18	106	419
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Insecta		623	9,477	36,853
	Microcoryphia	2	11	47
	Zygentoma	3	10	19
	Diplura	5	21	76
	Blattaria	4	11	40
	Isoptera	2	2	2
	Orthoptera	11	136	333
	Embioptera	2	3	5
	Psocoptera	18	44	102
	Diptera	107	1,706	6,601
	Coleoptera	140	2,757	12,005
	Lepidoptera	89	1,435	5,086
	Hymenoptera	72	1,580	7,509