

The Italian skill network of Soil Biological Quality assessed by microarthropods' community



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Development, implementation, and standardization of the QBS-ar index

Presence of microarthropod in relation to their peculiar soil adaptation level (Parisi, 2001)

48 biological forms (with EMI) in 26 taxa



Opiliones:10

Collembola: 1 < 2 < 4 < 6 < 8 < 10 < 20



Diplura:20



Coleopterans: 1 < 5 < 10 < 20



Tysanoptera:1

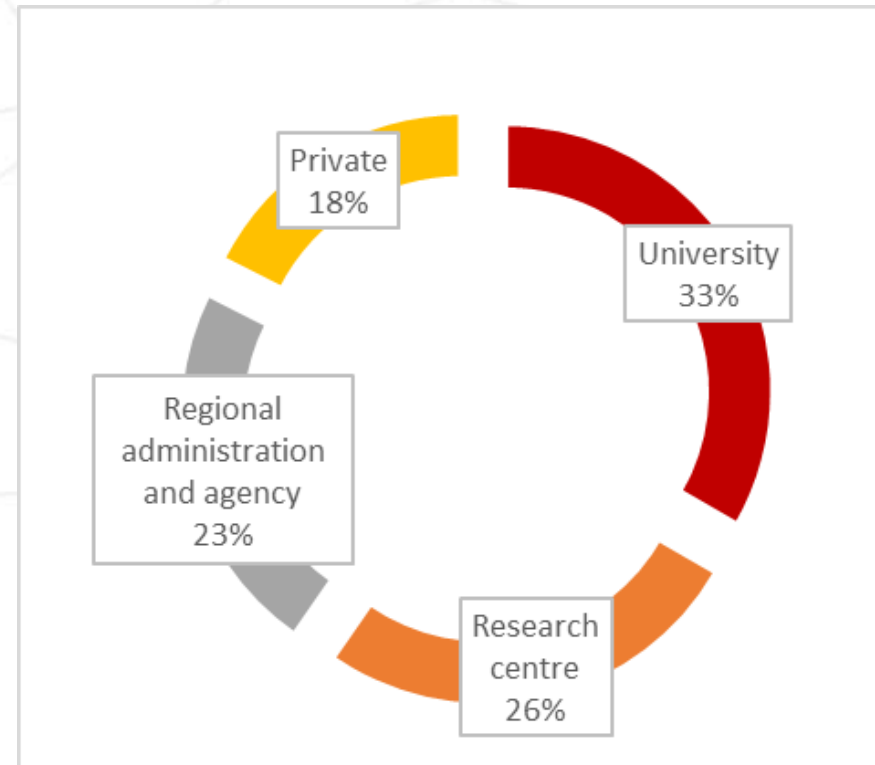


Network aim

- ✓ guarantee the correct QBS-ar use in each application phase everywhere, allowing comparison between sites;
- ✓ create synergies among researchers applying QBS-ar index in soil monitoring programs and projects;
- ✓ gather dataset and publication to promote knowledge in soil microarthropods communities;
- ✓ develop a standardized protocol of QBS-ar application for different climatic zones;
- ✓ promote short training courses for beginners or experts;
- ✓ help users to solve troubleshooting during identification.



Nowadays 55 QBS-ar experts throughout Italy, mainly academic researchers



Flow chart and time schedule

Coordination

RESEARCH CENTRES
COORDINATOR

UNIVERSITIES CORDINATOR

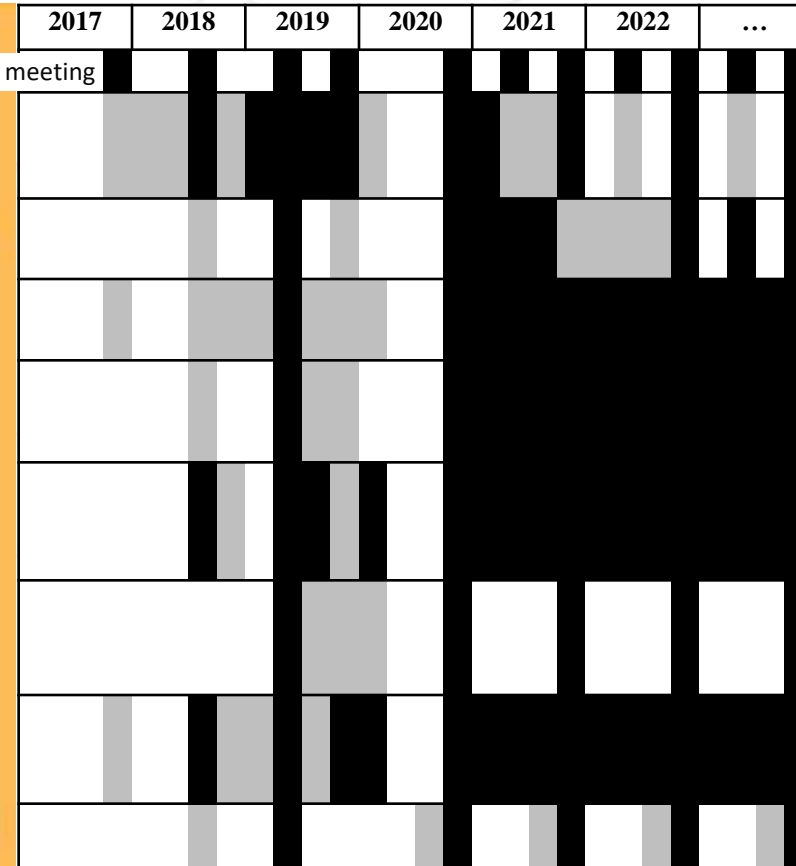
REGIONAL ADMINISTRATIONS
AND AGENCIES COORDINATOR

PRIVATE COORDINATOR

Subgroups

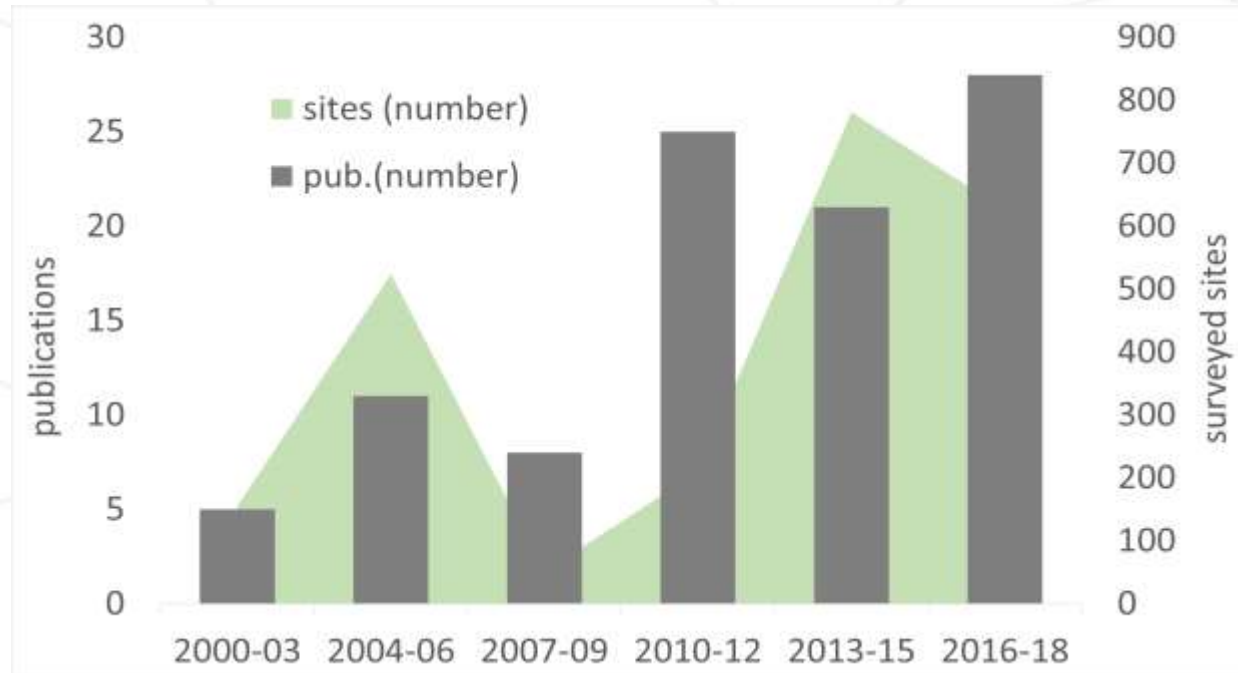
- Standardization of the protocol (26 members)
- Quality classes revision (22)
- Georeferenced database (15)
- Project proposal management (24)
- Identification keys and troubleshooting (13)
- Laboratory ring test (9)
- Website management and logo (5)
- QBS training courses (8)

Plenary meeting



■ setting phase ■ operational phase

QBS-ar relating publications, made available for members



100 publications, more than 2600 soil sites investigated

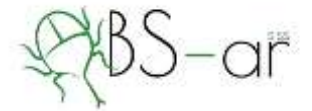
SWOT analysis



STRENGTHS	WEAKNESSES	OPPORTUNITIES	THREATS
Robust	Quality Classes to be redefined	Possibility of on-line data inserting	Data Quality Control still absent
Cheap	Generic	Soil Food Webs Insights	Homogeneous Database Implementation
Easy-to-learn, to set up & to implement	Multiple Disturbance Factors	Soil Community Structure Definition	Implementation in not-applicable contexts
Fast in reckoning the final value	Actual representativeness of the sample sites	Correlation with soil resilience to specific stress factors	Mistakes in procedure implementation or in EMI assignment
Data Ecosystem Approach	Not always well-applied outside Italy	Implementation to several scales	Need of milestone sites
Numerical, non-qualitative index	Hard response to forests selective cutting	Easy method's efficacy Communication	Vertical fluctuations, soil humidity and temperature correlations at sampling moment
Short term index, expression of biodiversity	Eventual reference site need (Treatment vs. Control)	Robust Regional Dataset Implementation	Does not allow to check which soil degradation cause and needs other indexes correlation
Soil researchers appreciation	Does not consider specimens abundances	Direct relationship with soil porosity, land use and agricultural practices	Sensitive Species may determine their Faunal Unit absence
Easy to sample and easy to identify Faunal Units			
Represents soil aggregate distribution better than other diversity indexes			

Logo: call for tender

Some examples



Versions of winner (Dr. Aldo D'Alessandro)

Winning logo



Thank you for your attention, and join QBS-ar working group, is free!



<https://scienzadelsuolo.org/QBS-ar.php>

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and all the members of the National Working Group



additional



sampling



Original Berlese extractors
CREA-DC Florence

Taxa	Main characteristics	EMI
Pseudoscorpiones	Pincers similar to those of scorpions	20
Scorpiones	Pincers and tail with a venomous stinger. Only juvenile forms	10
Falciptera	3 mm Segmented abdomen with a whip-like flagellum	20
Opiliones	Eyes Segmented abdomen	10
Araneae	Eight legs Chelicerae with fangs	1 5
Mites	4 pair of legs	20
Isopods	7 pairs of jointed limbs	10
Diplopods	3 pairs of ventrally jointed legs	10 20
Pauropods	< 2 mm 33 pairs of legs in adult Branched antennae	20
Symphylans	Long segmented antennae Abdominal cerci	10
Chilopods	Forcipules Segmented body with a pair of legs (> 35)	10 20
Proturans	No antennae 3 pairs of legs, the first ones held up, pointing forward	20
Diplurans	Eyes-less, Long antennae Cerci (filamentous or pincer-like)	20
Springtails	Force 3 pair of legs	1 2

Form	Characteristics	EMI
Epigeic form	Pigmentation = Well-developed appendages Well-developed visual apparatus	2
Endilithic form	Small size Moderate pigmentation Average length of appendages	4
Endilithic form	Developed visual apparatus Not elongated appendages Pigmentation	6
Endilithic form	Scarcely developed appendages Short or absent force Pigmentation	8
Endilithic form	Absence of pigmentation Reduced dimension Force present but reduced	10
Endilithic form	No pigmentation No force Short appendages	20

48 biological forms in 26 taxa
Menta et al. 2018

Taxa	Main characteristics	EMI
Mycrocoryphia	Elongated body Long tail-like structures	10
Zygotoma	Silvery glitter or scales 2 lateroaffiliations as cerci	10
Dermoptera	Forceps-like pincers as cerci	1
Orthoptera	Elongated hind legs for jumping	1 20
Embioptera	Elongated body Wings in male	10
Isoptera	Short abdominal cerci	10
Blattaria	Flattened body	5
Psocoptera	Long antennae Wings or wing-less	1
Hemiptera	Stylet mouthpart	1 10
Tysanoptera	Rectangular head Fringed wings	1
Coleoptera	Elytra	1 5 10 15 20

4 parameters have to be considered:

- Dimension (< 2 mm)
- Pigmentation (dark-brown colour)
- Reduced or absence of eyes
- Reduced or absence of wings

For each parameter, if present, 5 points are attributed and their sum is the EMI value.

Taxa	Main characteristics	EMI
Hymenoptera	Narrow waists	1 5
Diptera	Halteres (balancing organs)	1
Larvae	Coleoptera (Fig. 3) Sclerotized head 3 pairs of legs	10
	Diptera Small or absent head No legs	10
	Hymenoptera Bottle's shape Sometimes prolegs	10
	Lepidoptera 3 pairs of milk legs Prolegs with grasping spines	10
Other holometabolics	Mecoptera, Neuroptera, Raphidioptera	1