Degradazione dei mozziconi di sigaretta e impatto ecotossicologico

Prof. Giuliano Bonanomi
Dipartimento di Agraria
Università degli Studi di Napoli Federico II

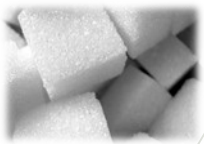
XXII CONGRESSO NAZIONALE
SOCIETÀ ITALIANA DI TABACCOLOGIA
15 l 16 Ottobre 2026 - Lecce



- I mozziconi di sigaretta sono il rifiuto più abbonante sulla terra



Biodegradabilità dei mozziconi









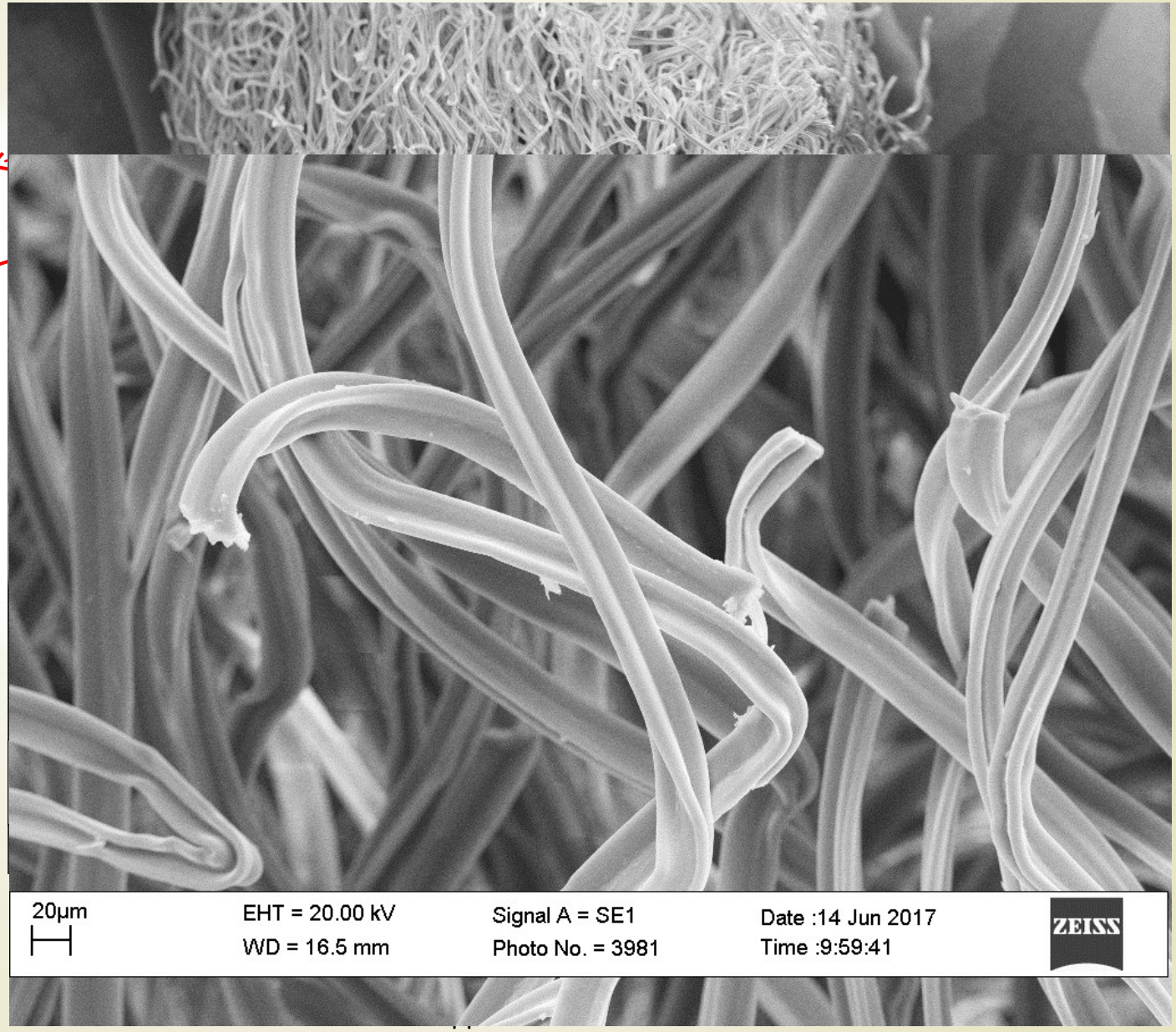


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Giorni Settimane Mesi Anni

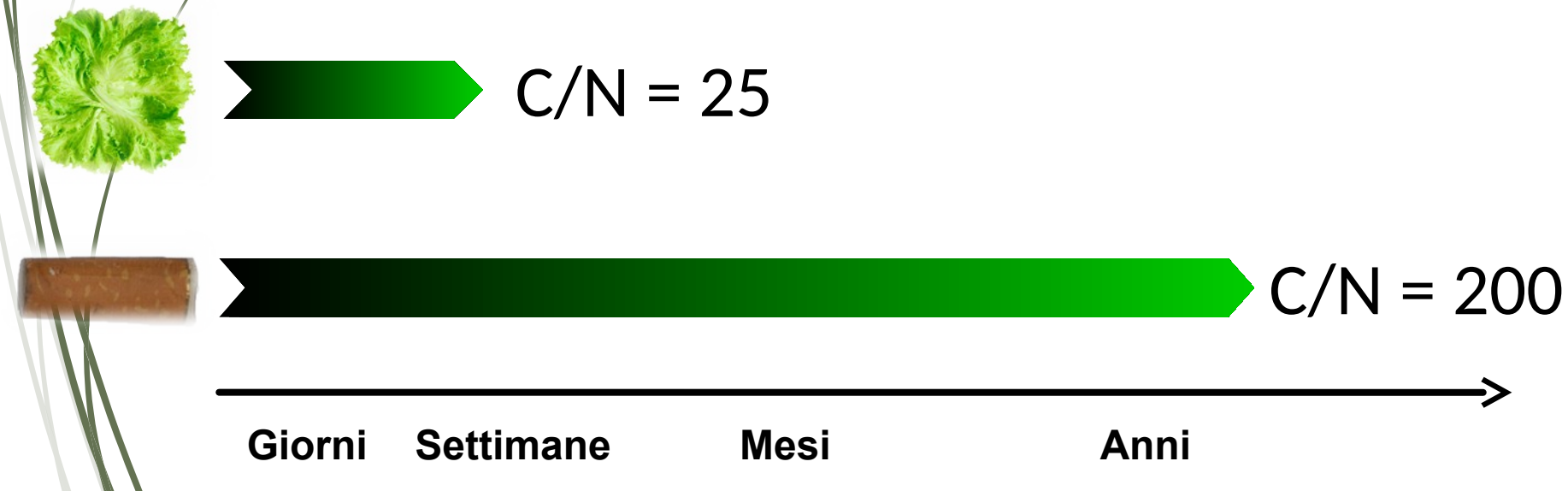
Di cosa sono fatti i mozziconi?





Biodegradazione: il ruolo dell'ambiente, della qualità del C organico e dell'N

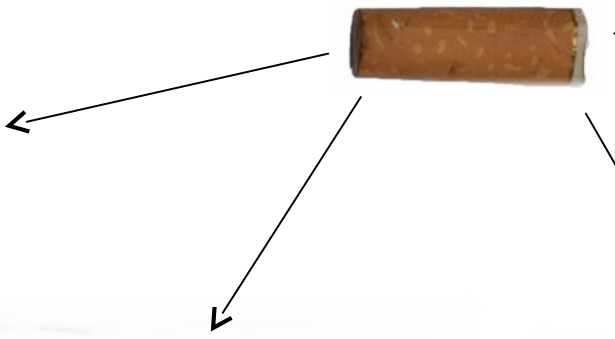
- Temperatura
- Umidità del substrato
- Disponibilità di azoto (N). Il rapporto C/N ideale per la degradazione microbica è di circa 25-30

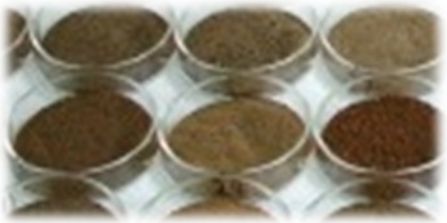


Esperimento di lungo termine: 10 anni

- Raccolti ed incubati 12,000 mozziconi «fumati»

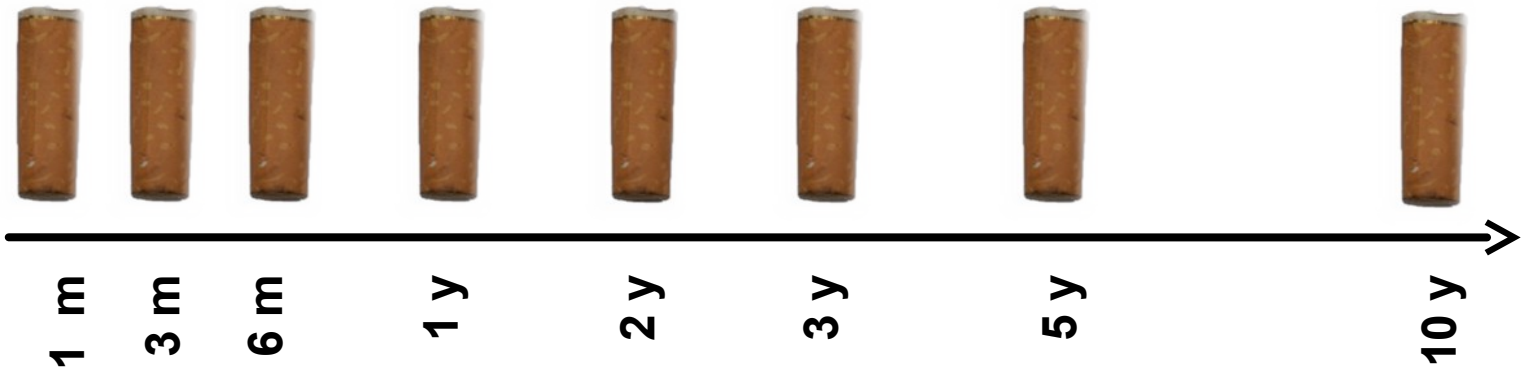




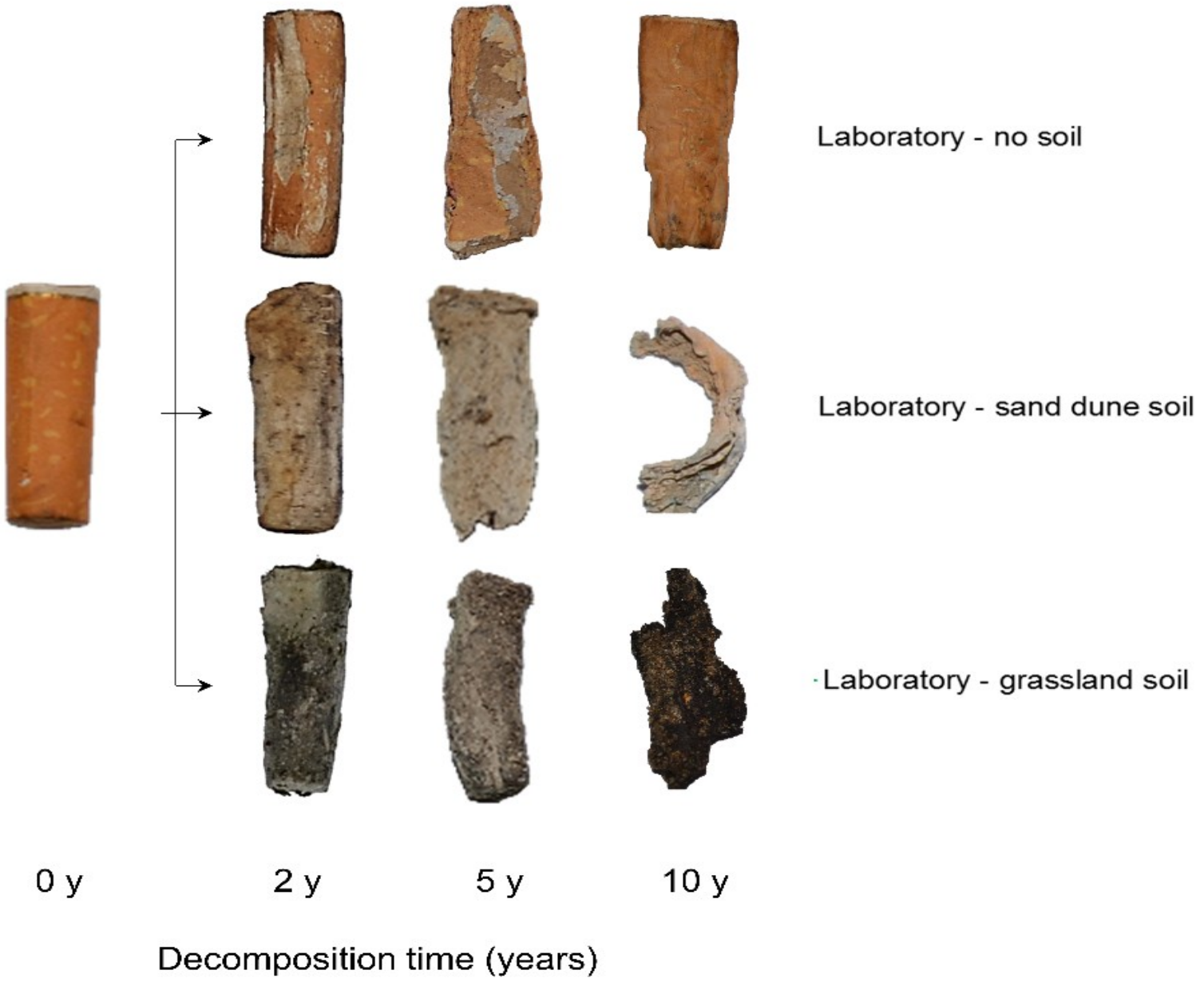




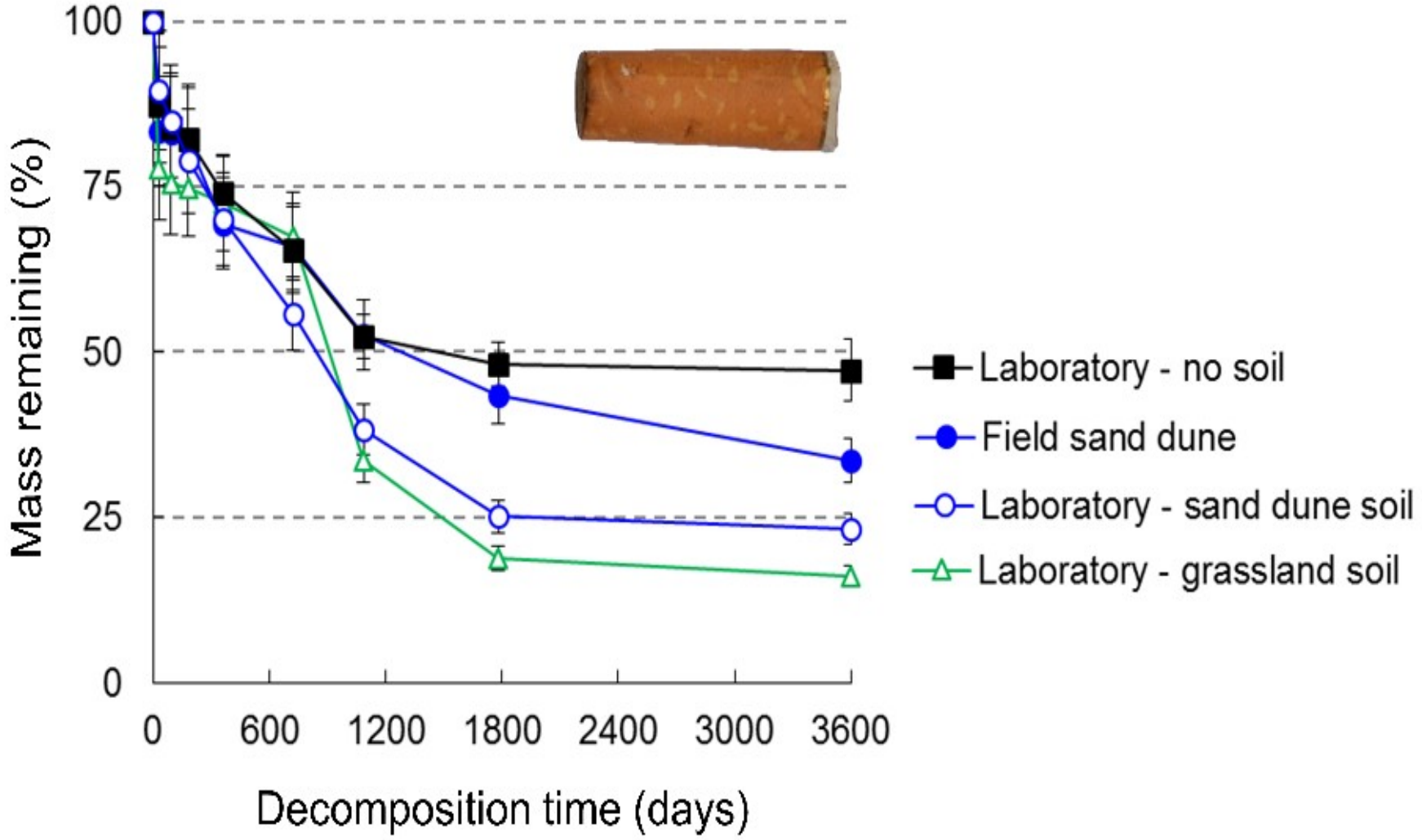




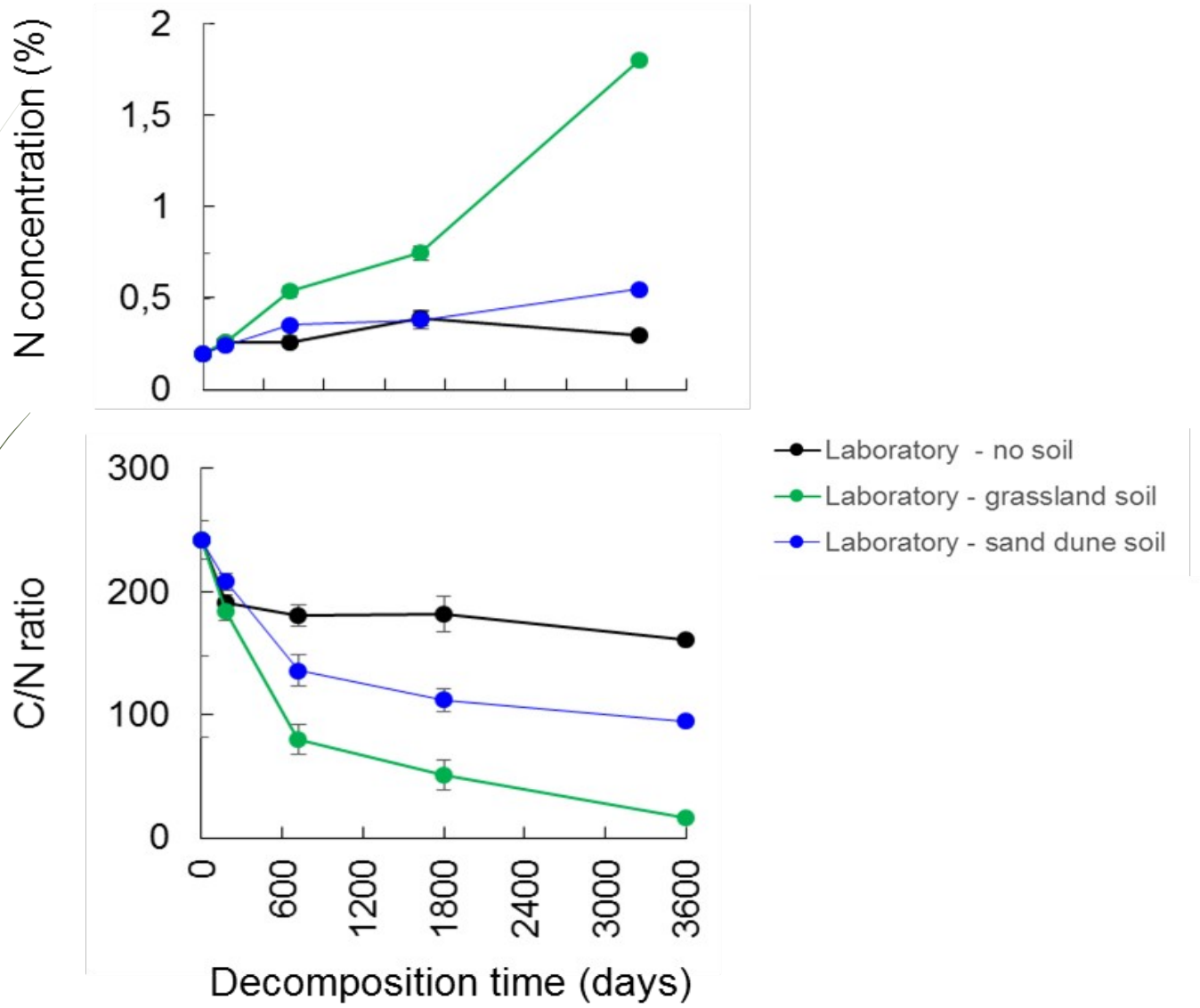
Risultati: cambiamento di aspetto



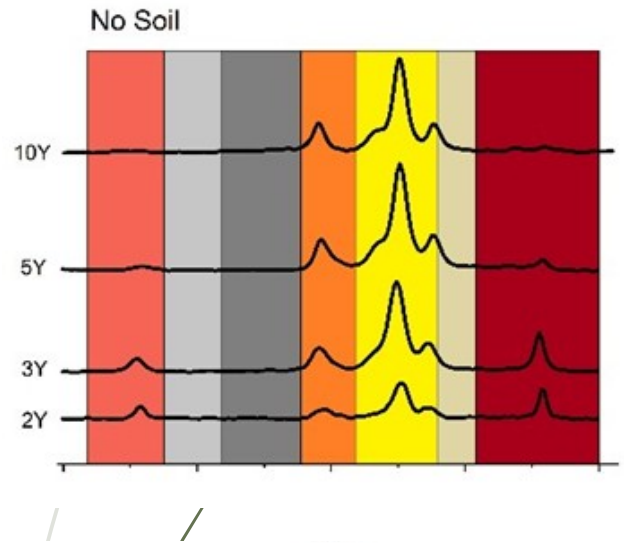
Risultati: perdita di massa

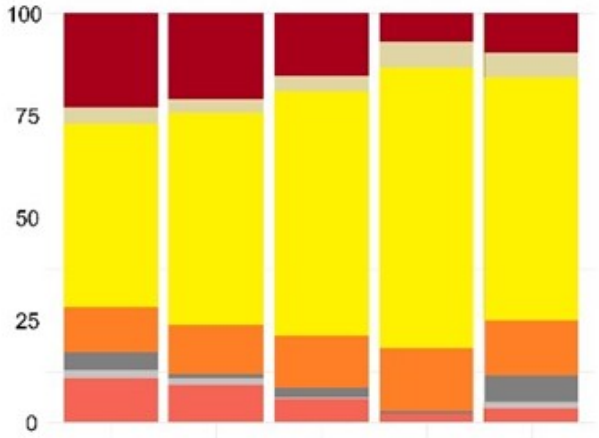


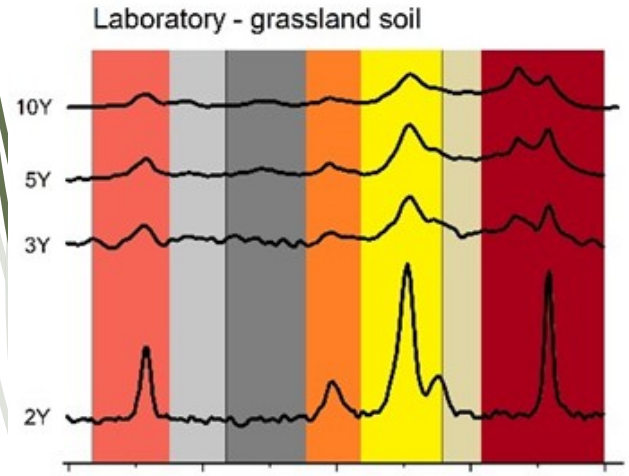
Transferimento di azoto dal suolo

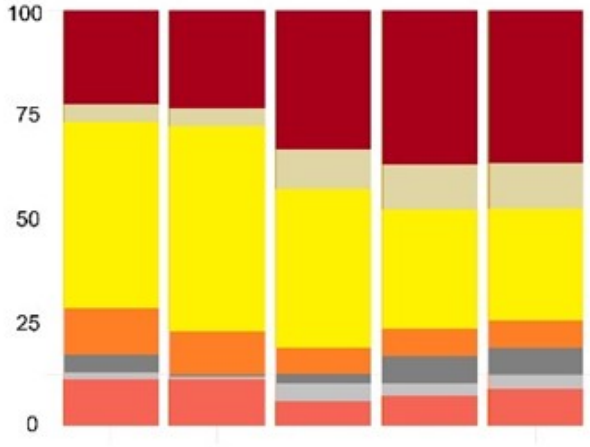


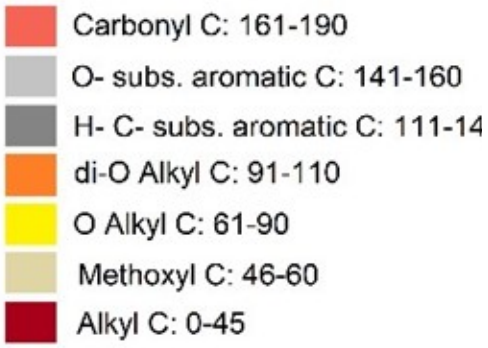
Qualità del carbonio organico: ^{13}C CPMAS NMR



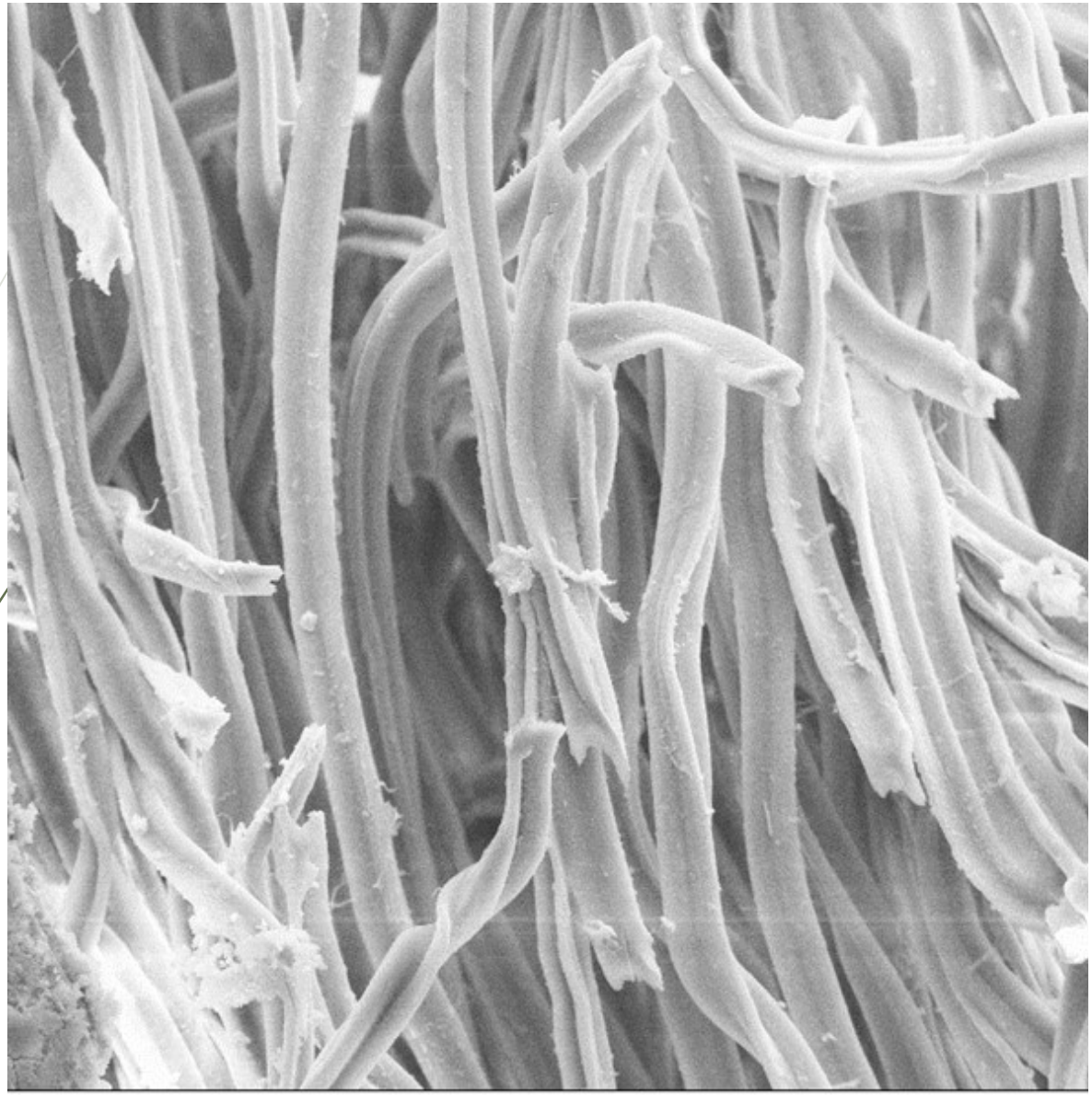




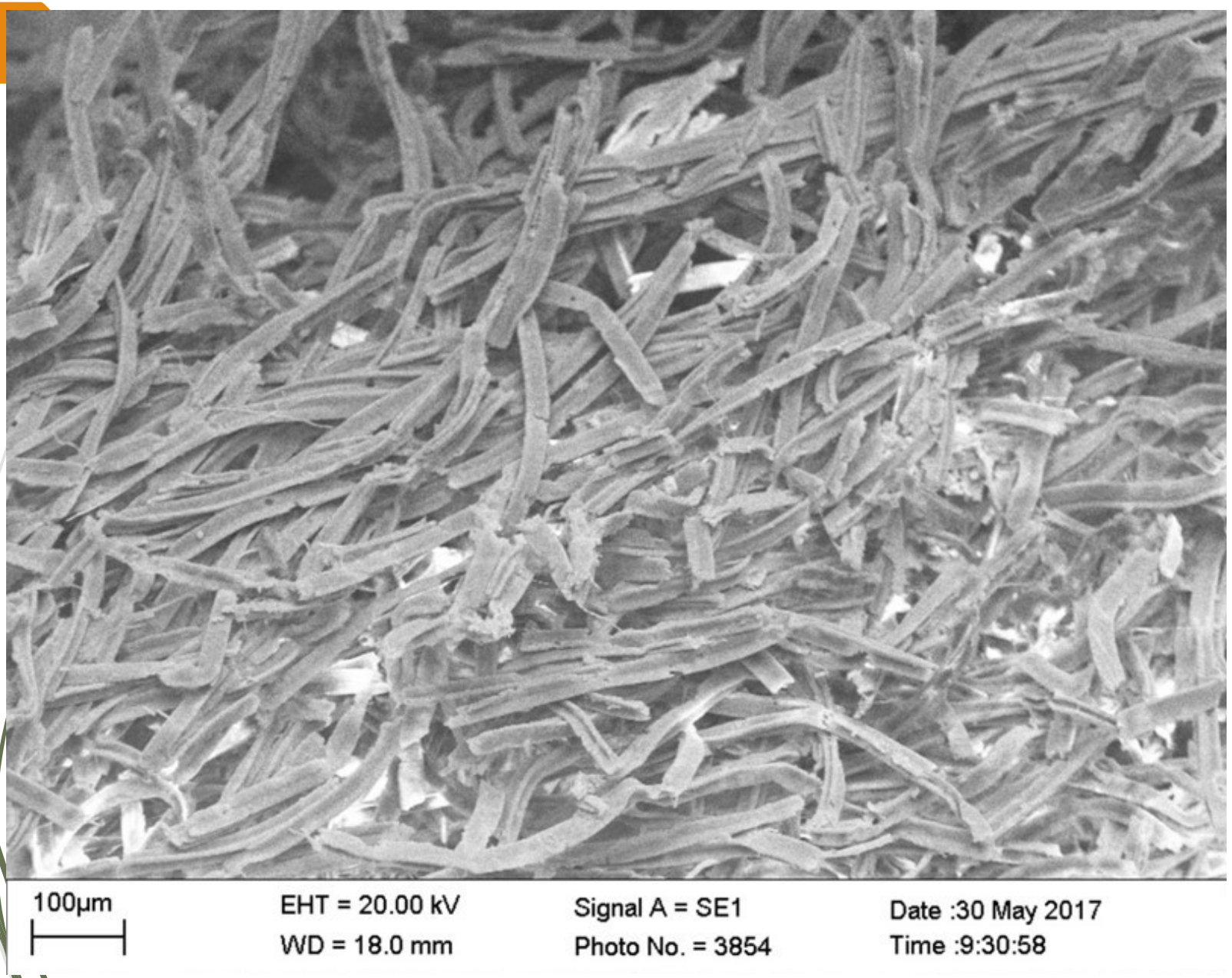




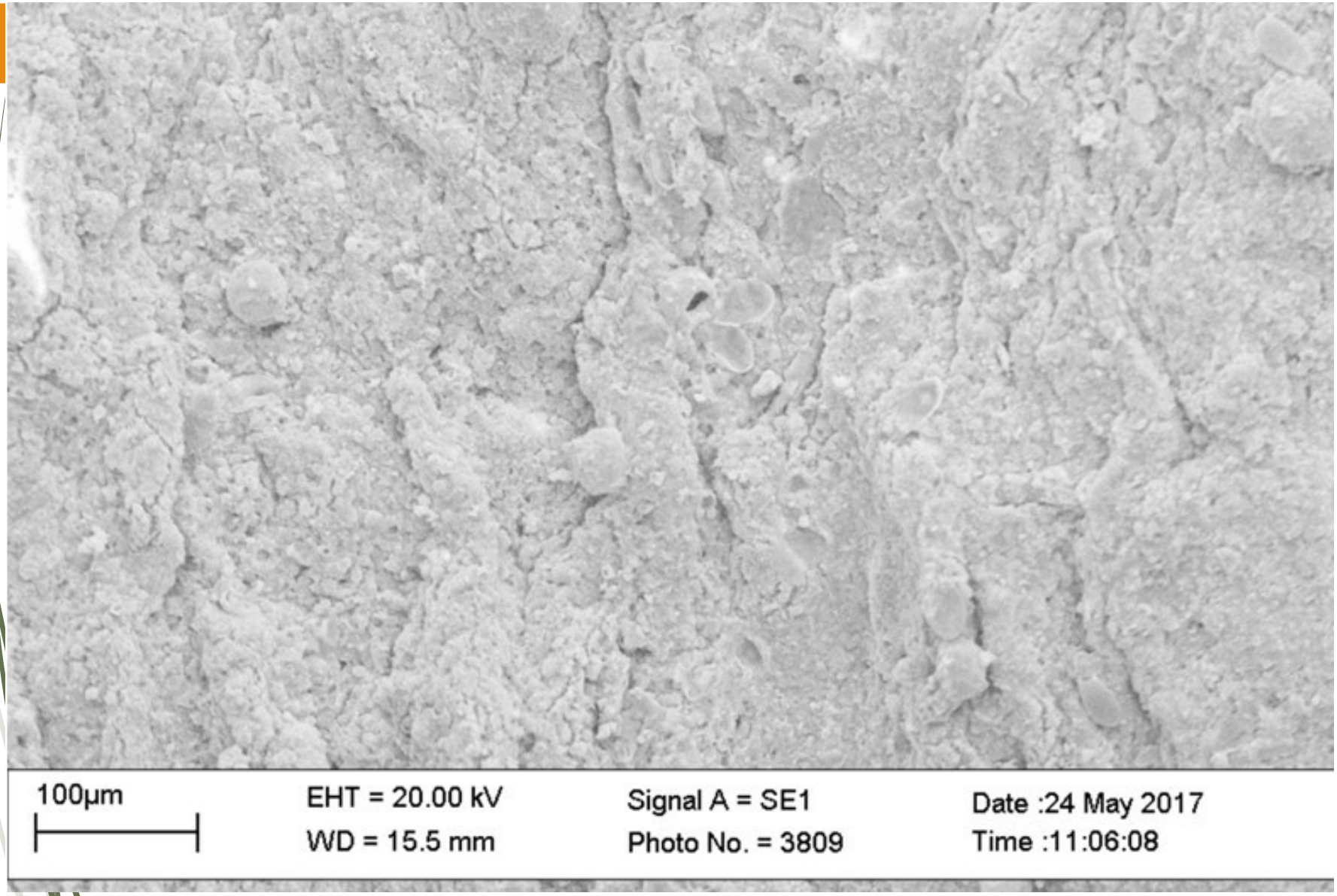
Dopo 10 anni su asfalto: perdita peso 52%

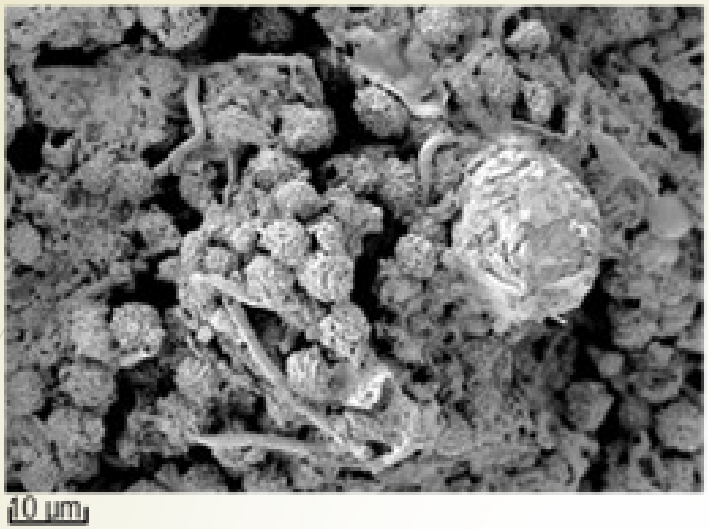


Dopo 10 anni sulla spiaggia: perdita peso 75%

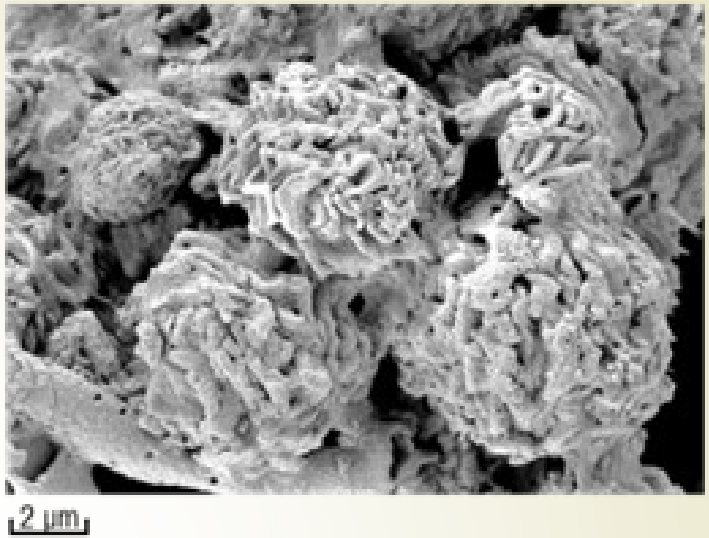


Dopo 10 anni in prateria: perdita peso 85%

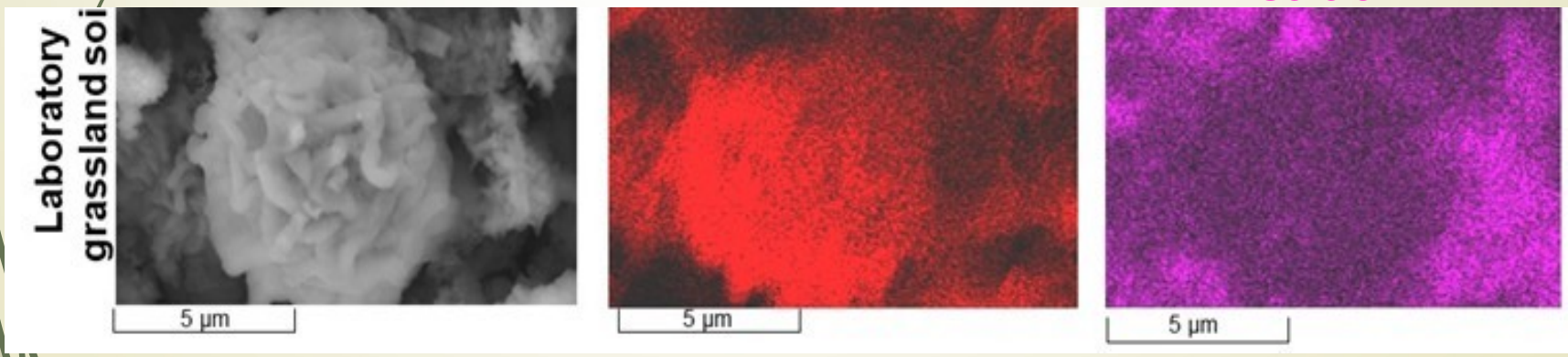




Laboratory - grassland soil



Laboratory - grassland soil



Ecotossicità dei mozziconi













Ecotossicità









Ecotossicità dei mozziconi

- **1 mozzicone per litro** è sufficiente a determinare effetti tossici su un ampio spettro di organismi
- Organismi acquatici più sensibili di quelli terrestri



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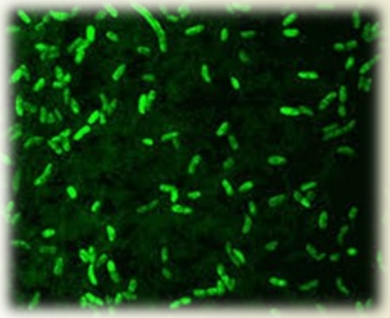
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- La decomposizione dei mozziconi influenza la tossicità?

Ecotossicità dei mozziconi

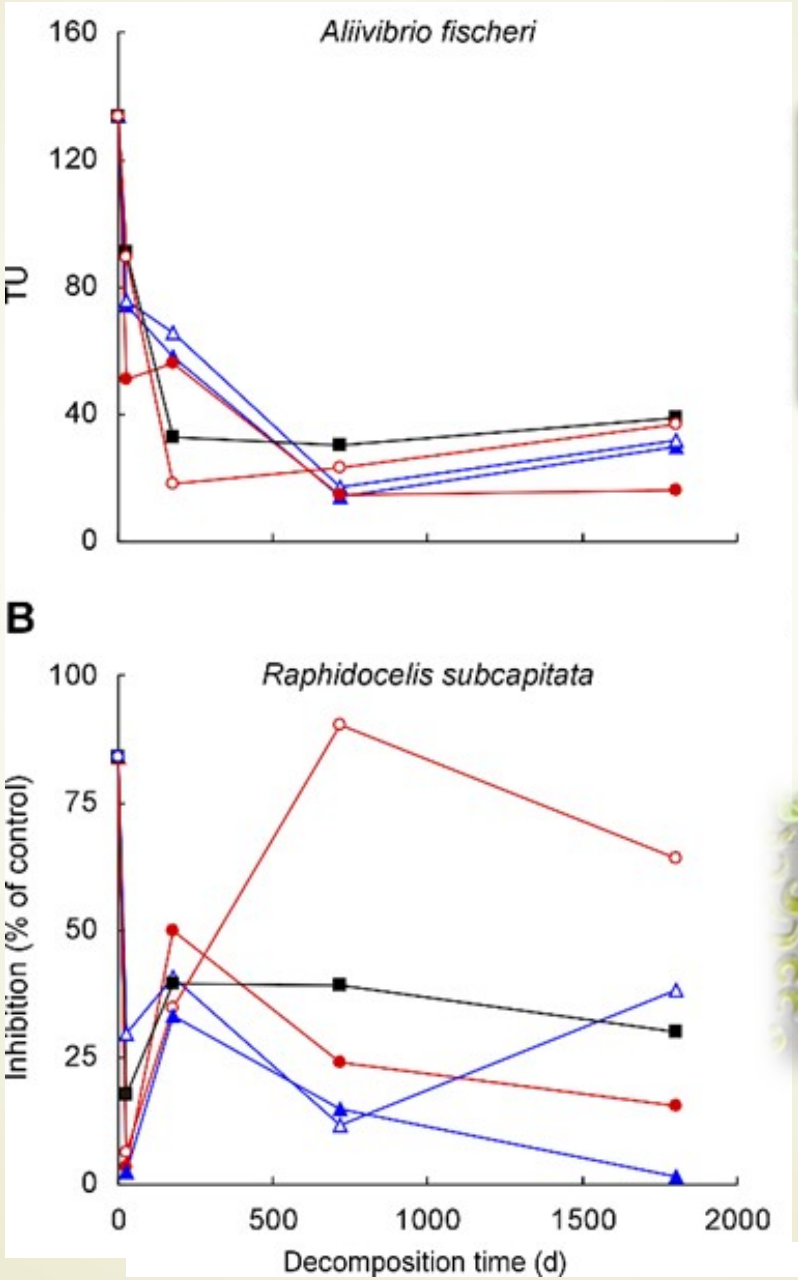
- Test di tossicità acuta con *Aliivibrio fischeri* ISO 11348-3:2009

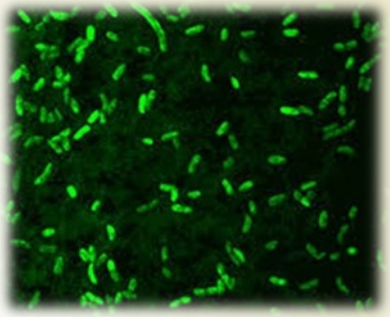


- Test di tossicità cronica con *Raphidocelis subcapitata* ISO 8692:2012



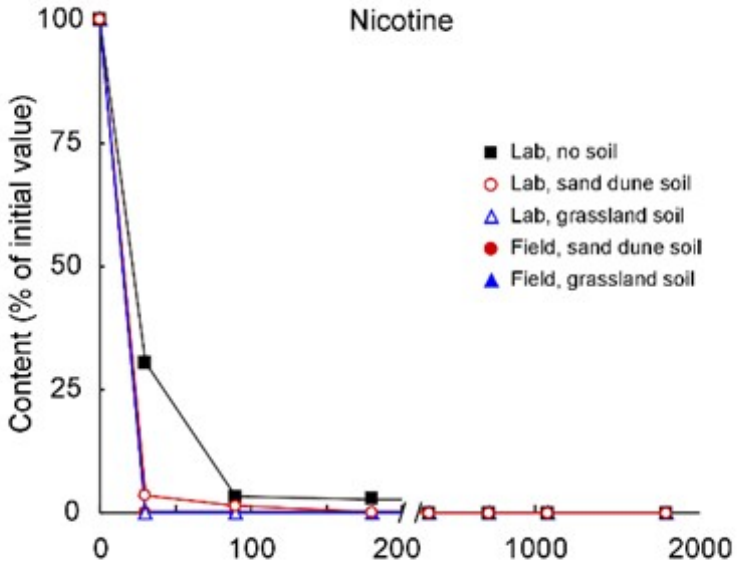
Ecotossicità & decomposizione

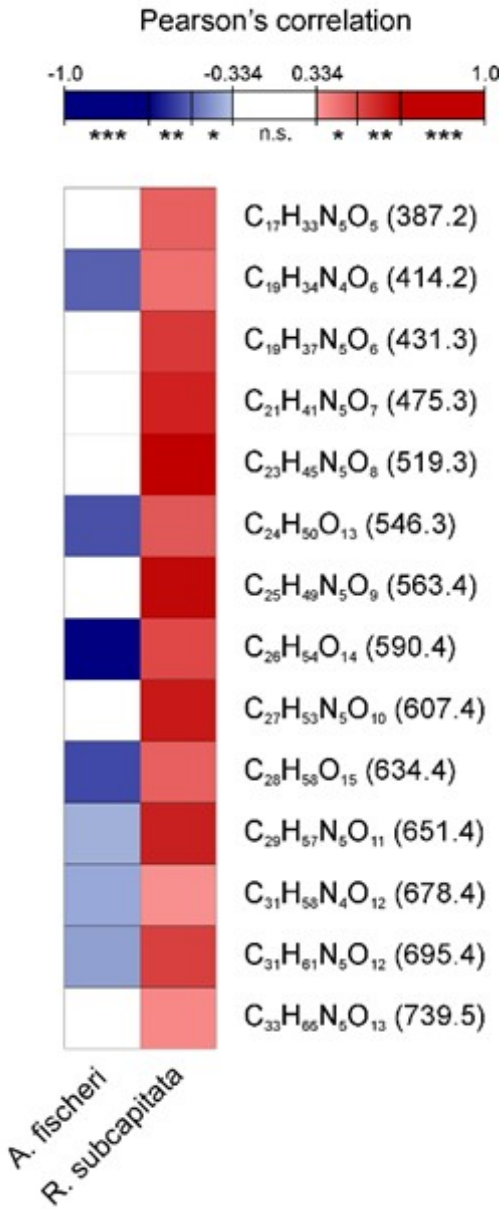




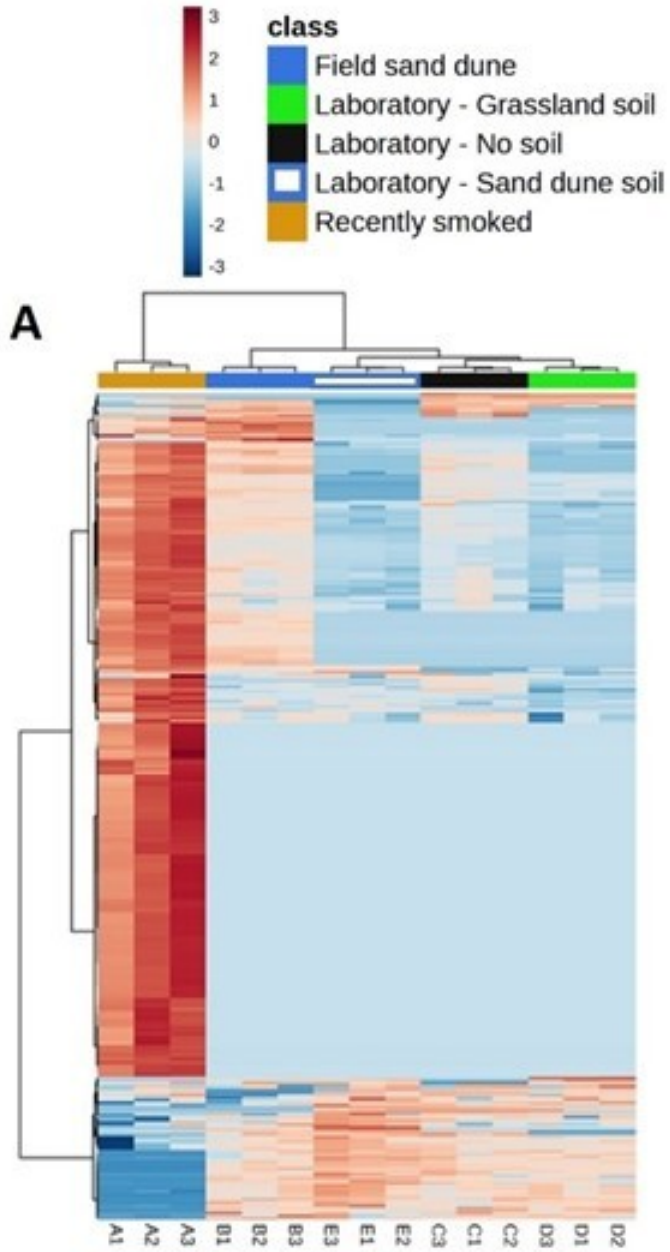


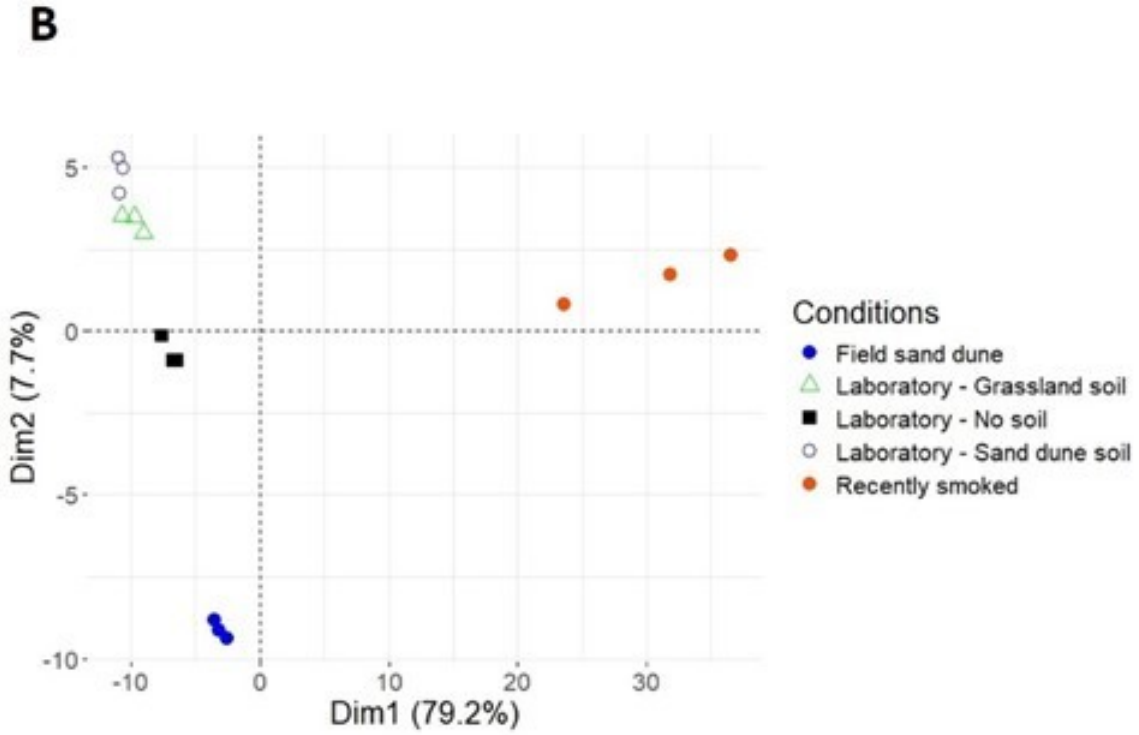
Ecotossicità & decomposizione



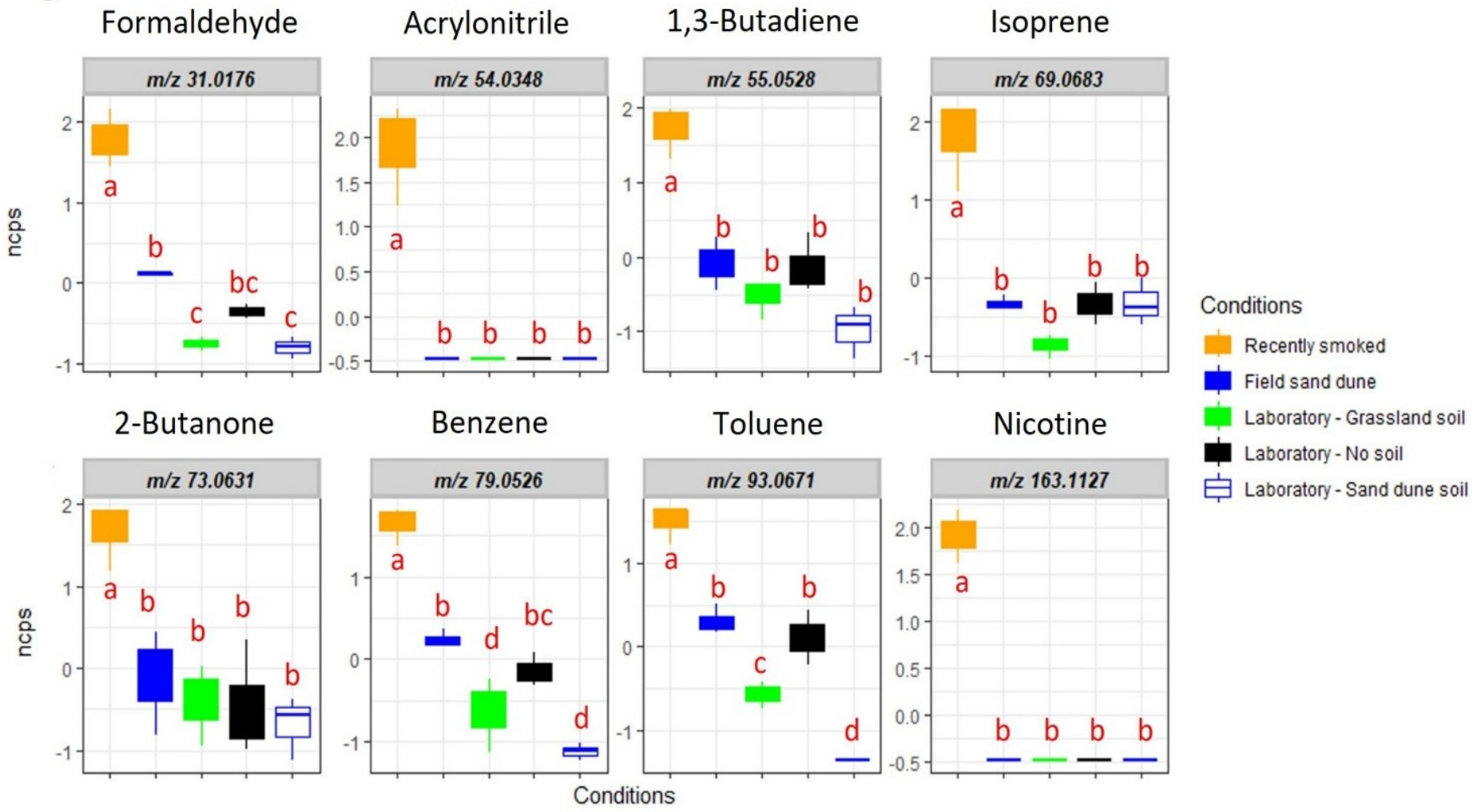


Mozziconi ed emissione di VOCs





Mozziconi ed emissione di VOCs



Conclusioni

- La degradazione biologica dei mozziconi è un processo limitato dalla presenza di gruppi acetato nella cellulosa e dalla carenza di N
- La degradazione è più rapida in presenza di suolo ricco di azoto ed in condizioni di pieno campo. Dopo dieci anni, in assenza di suolo, la degradazione è molto ridotta
- L'ecotossicità dei mozziconi di riduce drasticamente durante la decomposizione, soprattutto in condizioni di pieno campo

Contents lists available at ScienceDirect

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journal homepage: www.elsevier.com/locate/envpol



The fate of cigarette butts in different environments: Decay rate, chemical changes and ecotoxicity revealed by a 5-years decomposition experiment☆

Giuliano Bonanomi [a, b, *], Giulia Maisto [c], Anna De Marco [h], Gaspare Cesarano [a], Maurizio Zotti [a], Pierluigi Mazzei [g], Giovanni Libralato [c], Alessia Staropoli [a, e], Antonietta Siciliano [c], Francesca De Filippis [a, b], Antonietta La Storia [a], Alessandro Piccolo [a, b, d], Francesco Vinale [e, i], Antonio Crasto [a], Marco Guida [c], Danilo Ercolini [a, b], Guido Incerti [f]

Environmental Pollution 397 (2026) 127944

Contents lists available at ScienceDirect

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journal homepage: www.elsevier.com/locate/envpol



Long-term cigarette butts' decomposition over 10 years reveals multi-stage microbial, chemical, and toxicological transformations

Giuliano Bonanomi [a,b], Giuseppina Iacomino [a], Daniela D'Esposito [c], Maurilia Maria Monti [c], Antonietta Siciliano [d], Lucia Santorufo [d], Marisa Spampinato [d], Michelina Ruocco [c], Maria Vittoria Verrillo [a], Riccardo Spaccini [a], Ahmed M. Abd-ElGawad [e], Luigi F. Di Costanzo [a,*,1], Mohamed Idbella [f,**,1]


Grazie per l’attenzione

Ecotossicità dei mozziconi

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Full length article

A comparison of electronic and traditional cigarette butt leachate on the development of Xenopus laevis embryos



biology letters

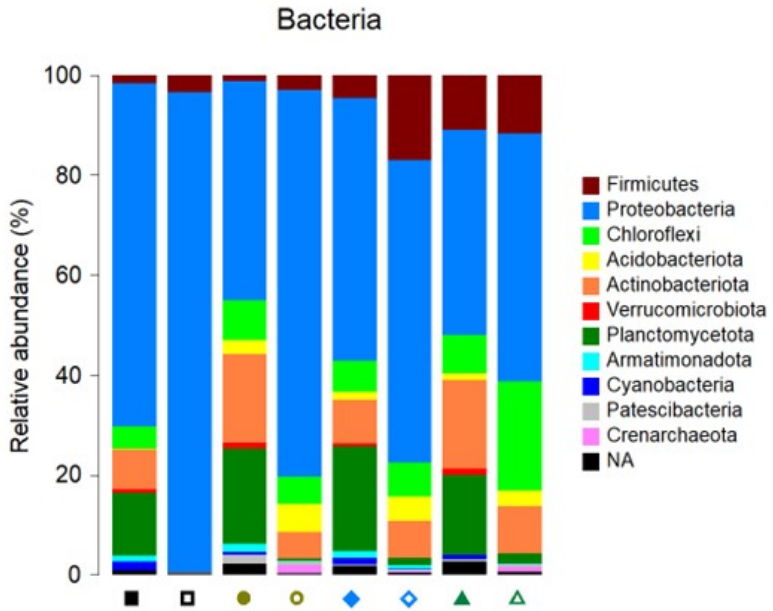
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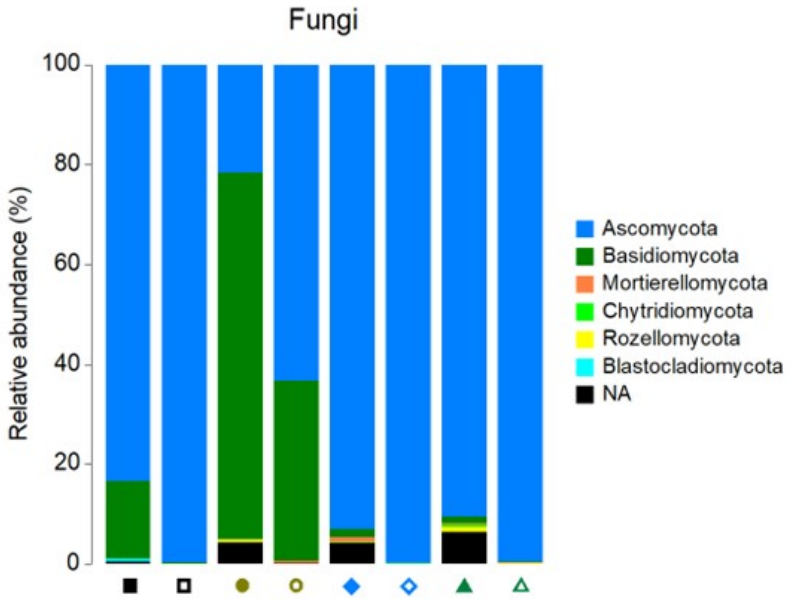
Research

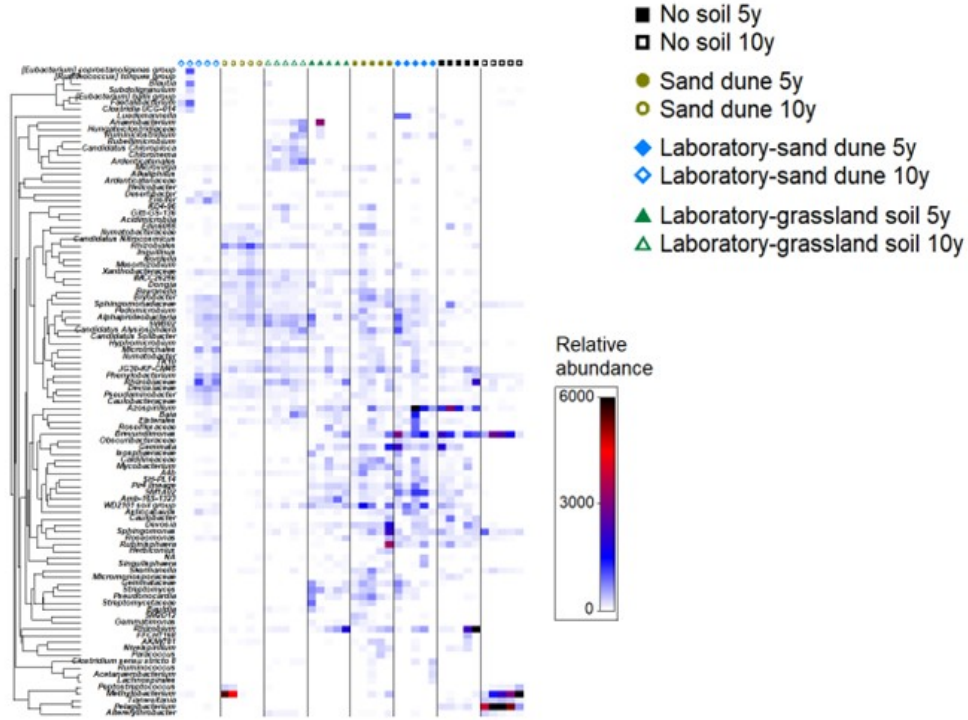
Animal behaviour

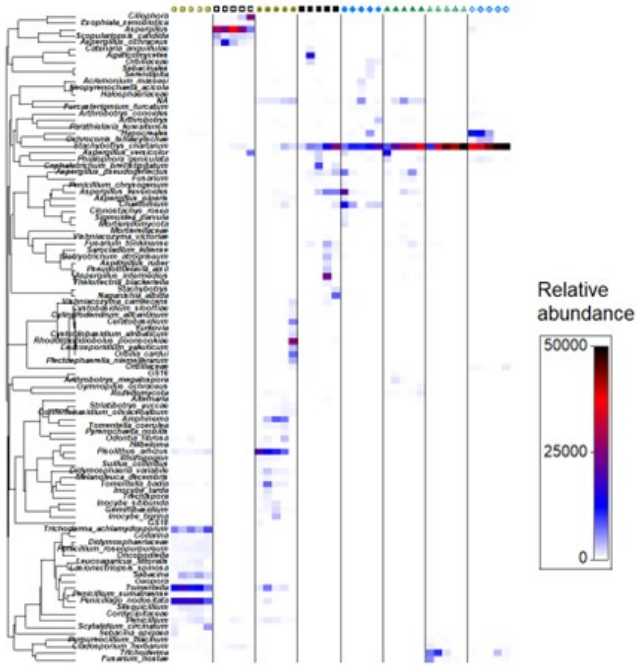
Incorporation of cigarette butts into nests reduces nest ectoparasite load in urban birds: new ingredients for an old recipe?

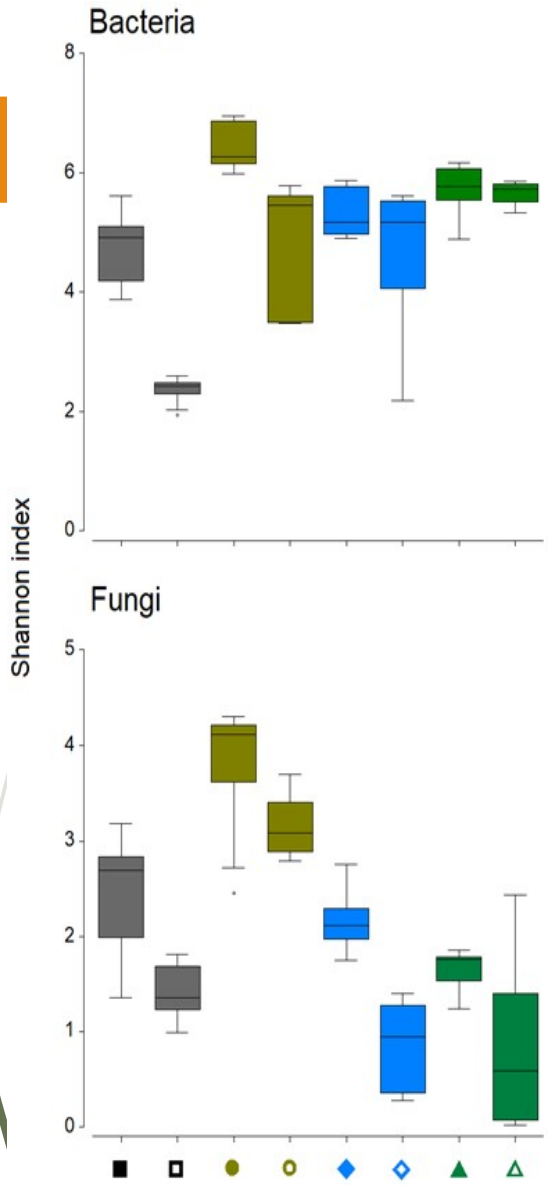
Monserrat Suárez-Rodríguez, Isabel López-Rull† and Constantino Macías Garcia

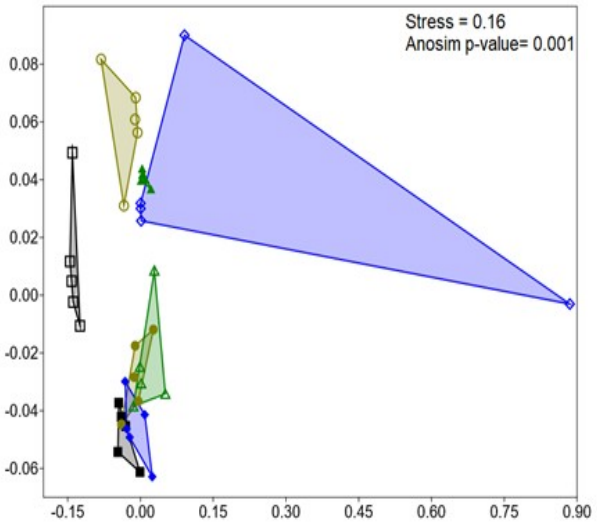

Bacteria
Relative abundance (%)
100
80
60
40
20
0
Firmicutes
Proteobacteria
Chloroflexi
Acidobacteriota
Actinobacteriota
Verrucomicrobiota
Planctomycetota
Armatimonadota
Cyanobacteria
Patescibacteria
Crenarchaeota
NA

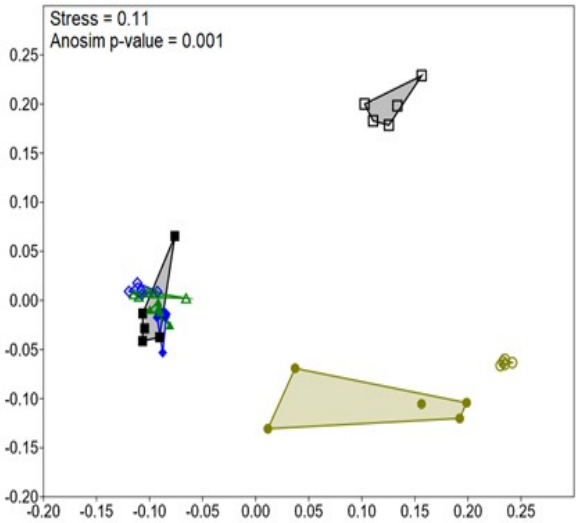

Fungi
Relative abundance (%)
100
80
60
40
20
0
Ascomycota
Basidiomycota
Mortierellomycota
Chytridiomycota
Rozellomycota
Blastocladiomycota
NA

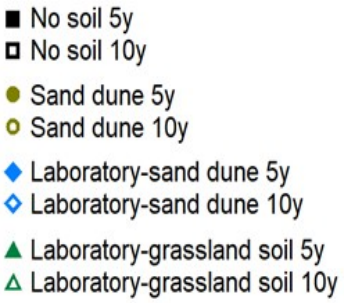

No soil 5y
No soil 10y
Sand dune 5y
Sand dune 10y
Laboratory-sand dune 5y
Laboratory-sand dune 10y
Laboratory-grassland soil 5y
Laboratory-grassland soil 10y
Relative abundance
6000
3000
0


Relative abundance
50000
25000
0


Bacteria
Fungi
Shannon index
0
2
4
6
8
0
1
2
3
4
5


Stress = 0.16
Anosim p-value= 0.001
0.08
0.06
0.04
0.02
0.00
-0.02
-0.04
-0.06
-0.15
0.00
0.15
0.30
0.45
0.60
0.75
0.90


Stress = 0.11
Anosim p-value = 0.001
0.25
0.20
0.15
0.10
0.05
0.00
-0.05
-0.10
-0.15
-0.20
-0.20
-0.15
-0.10
-0.05
0.00
0.05
0.10
0.15
0.20
0.25


No soil 5y
No soil 10y
Sand dune 5y
Sand dune 10y
Laboratory-sand dune 5y
Laboratory-sand dune 10y
Laboratory-grassland soil 5y
Laboratory-grassland soil 10y