



UNIVERSITÀ
degli STUDI
di CATANIA

Nano Rome, 15-18 September
2020Innovation
Conference & Exhibition



Estimated Daily Intakes of microplastics <math><10\ \mu\text{m}</math> for adult and children through vegetable and fruits ingestion. A new point of view for the risk assessment.

Oliveri Conti Gea, Zuccarello Pietro, Nicolosi Ilenia, Ferrante Margherita

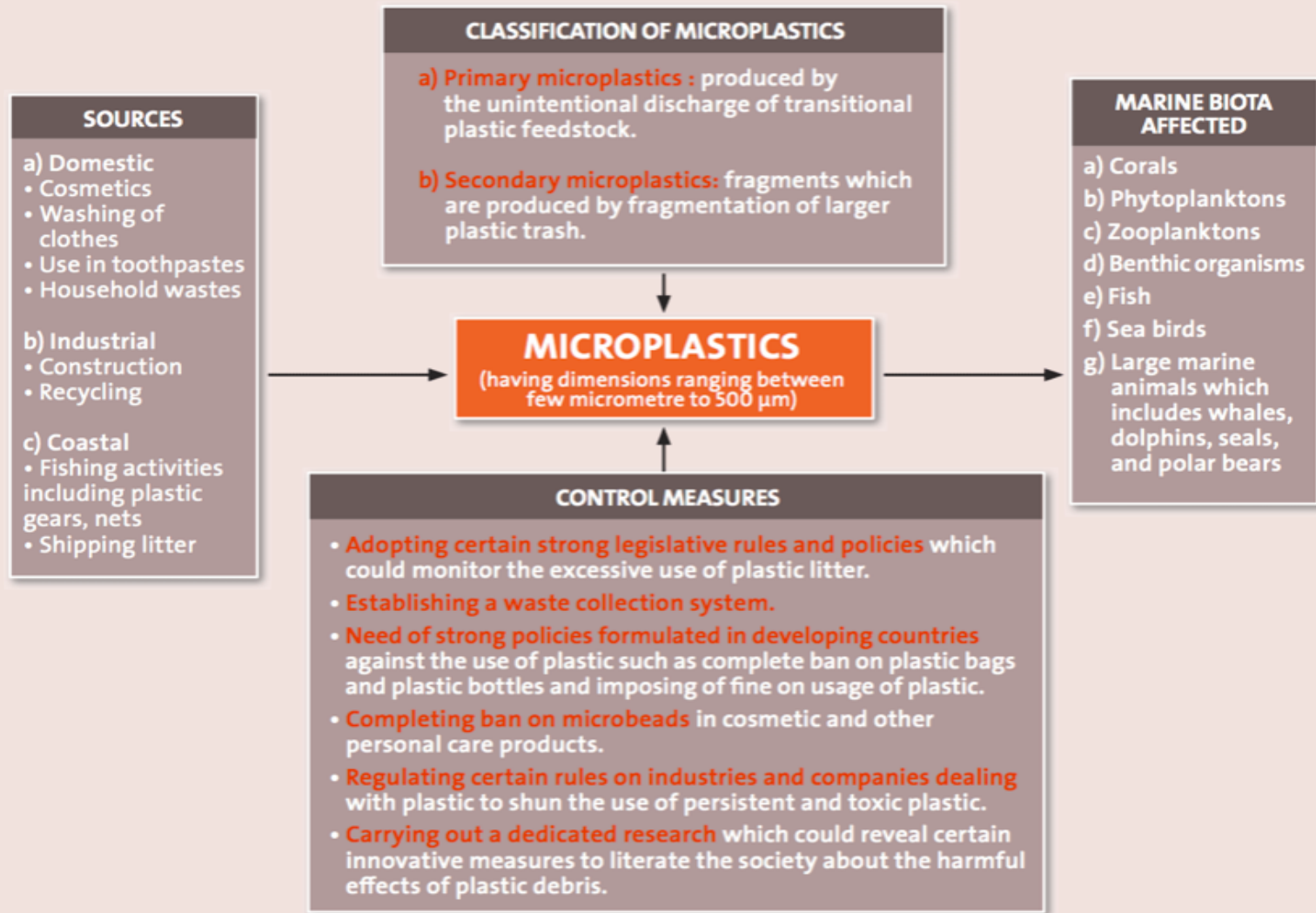
Environmental and Food Hygiene Laboratory (LIAA)

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NanoPlastics (NPs) are particles smaller than 1 micron (μm)





Microplastic formation



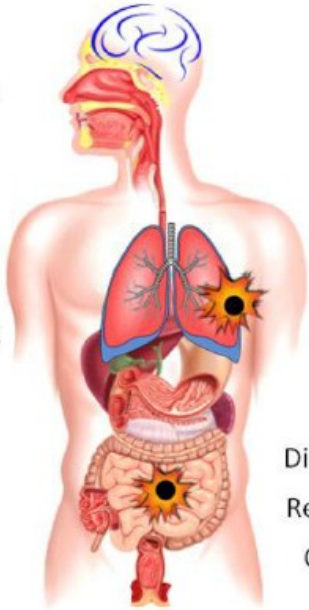
Biofouling

Contaminant sorption

Trophic transfer



Routes of Exposure



Skin irritation

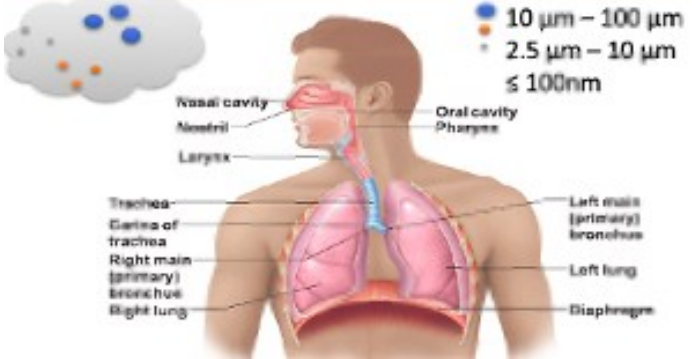
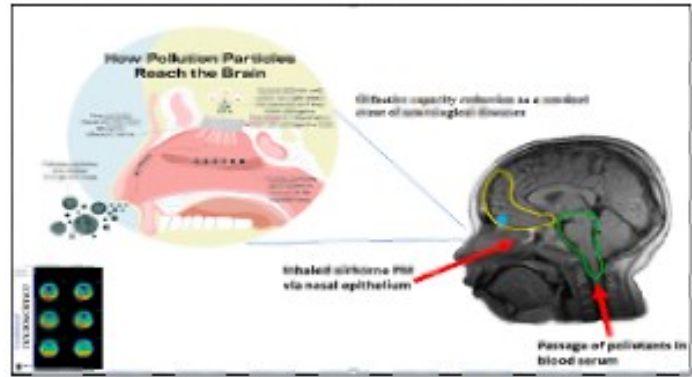
Respiratory problems

Cardiovascular disease

Digestive problems

Reproductive effects

Cancer



The presence of plastic fragments in the gastro-intestinal tract of fishes and in rural soil has already been proven by many studies.



THE NEW FOOD CHAIN



MICROPLASTICS

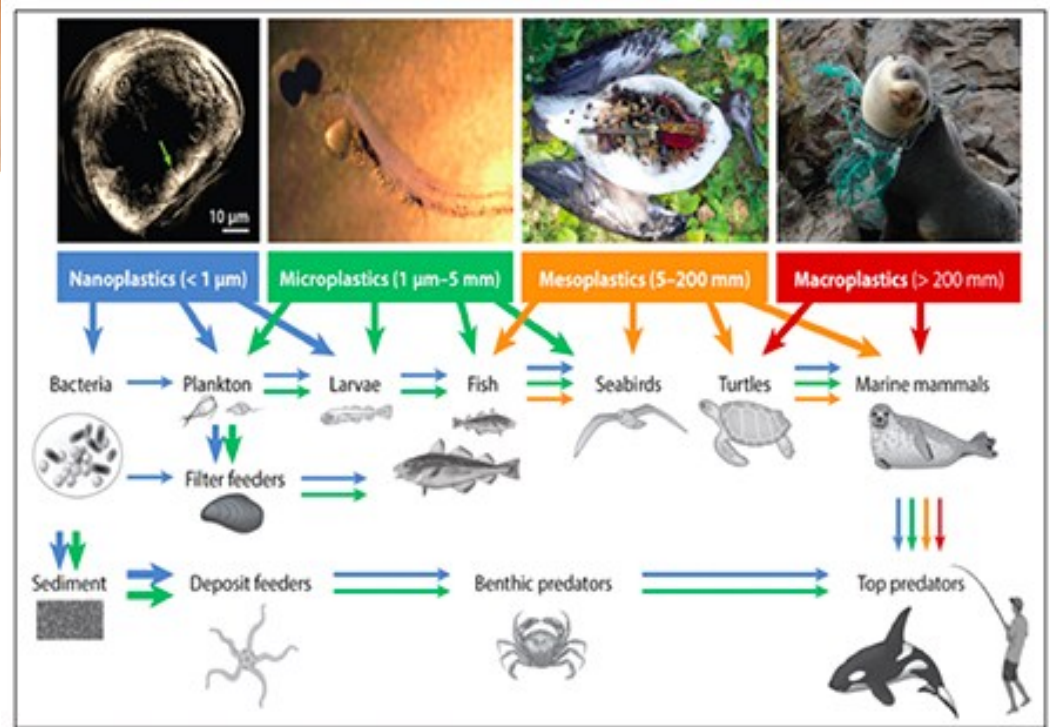


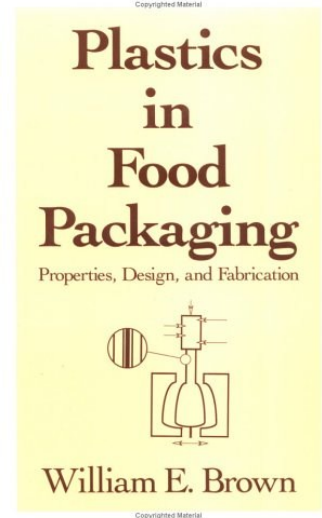
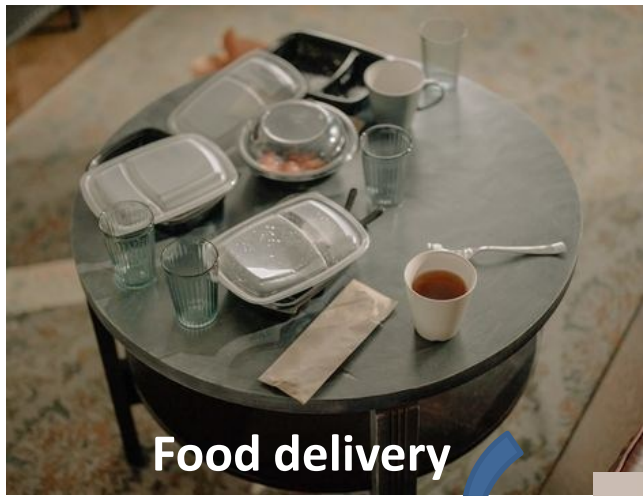
TO FISH



TO US

Food Exposure to MP- NPs





EU Single-use Plastic Directive

What will be banned by 2021?





Vegetables and fruits have never been investigated for nano- and microplastics.

Guo & Wang, 2019; <https://doi.org/10.1016/j.marpolbul.2019.03.019>

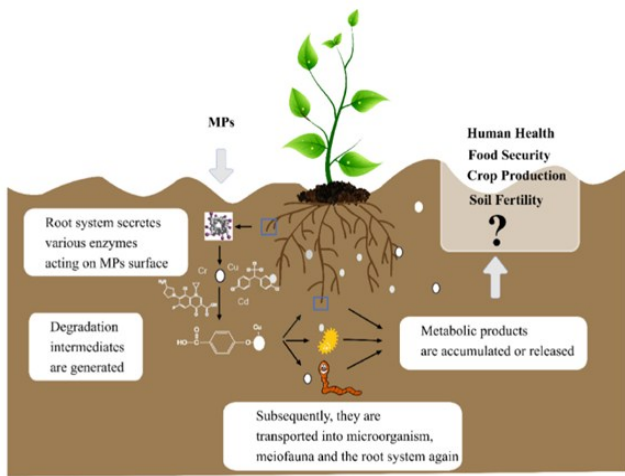
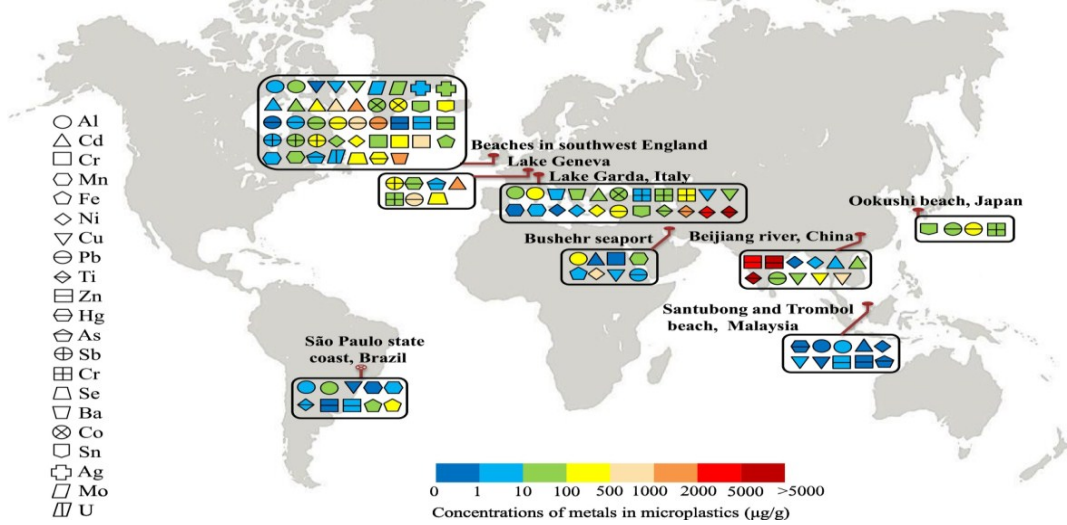
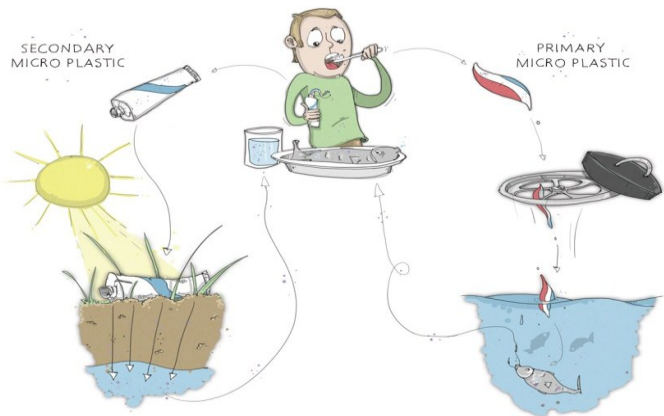


Fig. 3. Interactions between MPs and soil organisms.






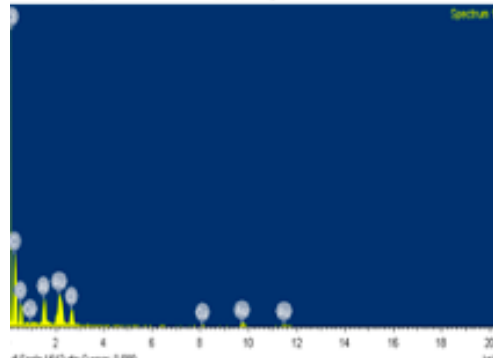
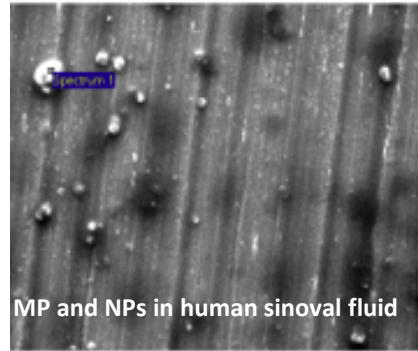
European Journal of Orthopaedic Surgery & Traumatology

May 2018, Volume 28, Issue 4, pp 637-643 | [Cite as](#)

Potential presence of metals in patients treated with metal-metal coupling prostheses for hip arthroplasty at 7 and 10 years of follow-up

Giuseppe Sessa, Gianluca Testa , Salvatore Gioitta Iachino, Luciano Costarella, Calogero Puma Pagliarello,

Margherita Ferrante, Alfina Grasso, Vito Pavone



**Our patent method
born from our
arthroprosthesis study
of the ankle joint.**





DE TULLIO & PARTNERS
INTELLECTUAL
PROPERTY
ATTORNEYS

Roma, 10 Dicembre 2018



*Ministero dello Sviluppo Economico
Direzione generale per la lotta alla contraffazione
Ufficio Italiano Brevetti e Marchi*

ai Signori
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Via e-mail

ns. rif.: AEDT 13584

Vs. rif.: Domanda di Brevetto Italiano per invenzione n. 102018000003337

Oggetto: Rapporto di ricerca ed opinione dell'esaminatore / Domanda Italiana di Brevetto per invenzione n. 102018000003337 dal titolo "Metodo per l'estrazione e la determinazione di microplastiche in campioni a matrici organiche e inorganiche"



**Environmental and Food
Hygiene Laboratory**

The method applied in the study has been nationally and internationally protected. The code of the submitted request of international patent's extension in several country of world is PCT/IB2019/051838 of 7 March 2019, coupled with Italian patent number 102018000003337 of 07 March 2018.

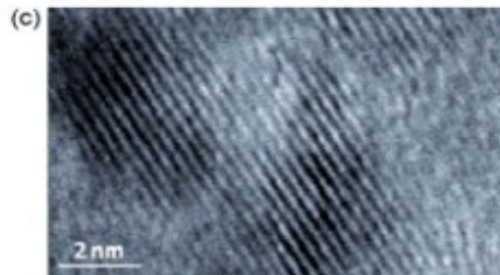
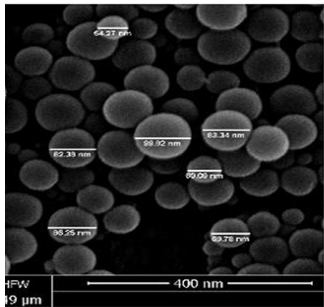
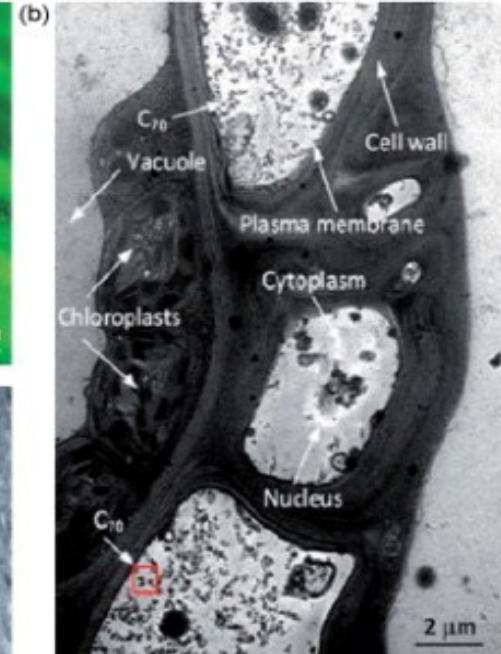
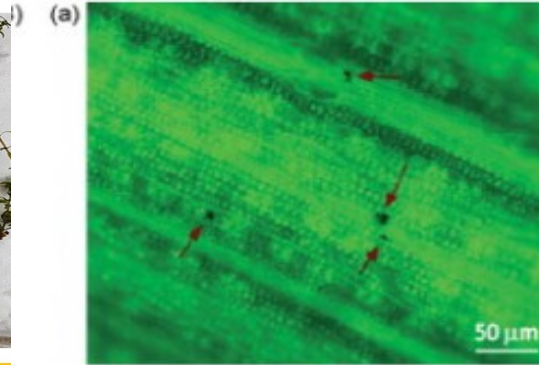
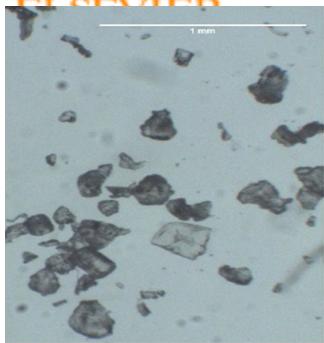


Some authors demonstrate the uptake and translocation of manufactured C-nanoparticles in vegetables!



Science of The Total Environment

Volume 654, 1 March 2019, Pages 1040-1047





In collaboration with Prof. Mohamed Banni
Higher Institute of Biotechnology Monastir, Tunisia

Environmental Research

Volume 187, August 2020, 109677

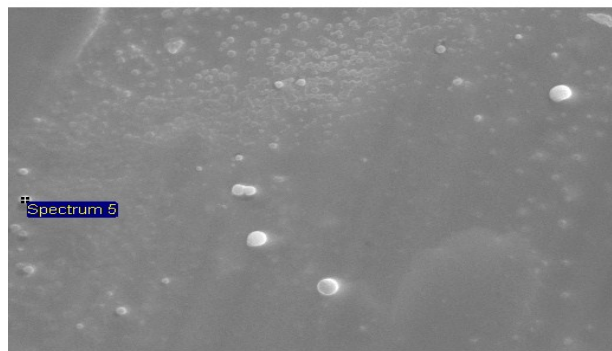


Micro- and nano-plastics in edible fruit and vegetables. The first diet risks assessment for the general population

Gea Oliveri Conti PhD ^a ✉, Margherita Ferrante ^a ✉, Mohamed Banni ^{b, c} ✉, Claudia Favara ^a ✉, Ilenia Nicolosi ^a ✉, Antonio Cristaldi PhD ^a ✉, Maria Fiore PhD ^a ✉, Pietro Zuccarello PhD ^a ✉

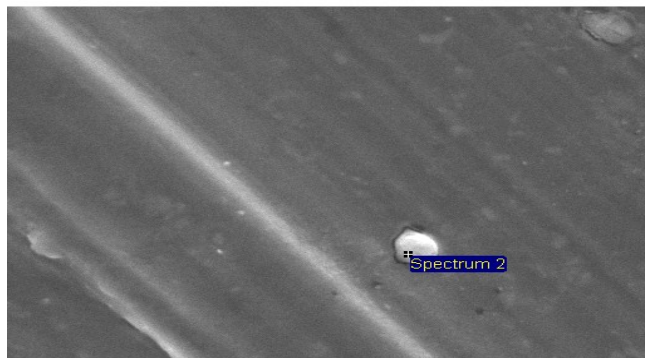
Apple, Pear, Lettuce, Broccoli,
Carrots, Potatoes

MICROPLASTICS IN VEGETABLES AND IN FISH



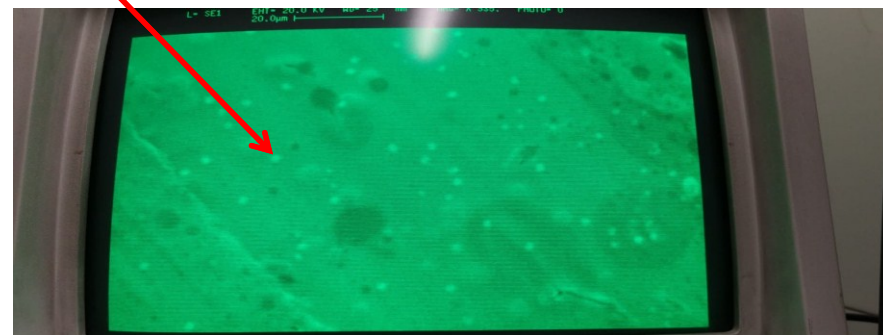
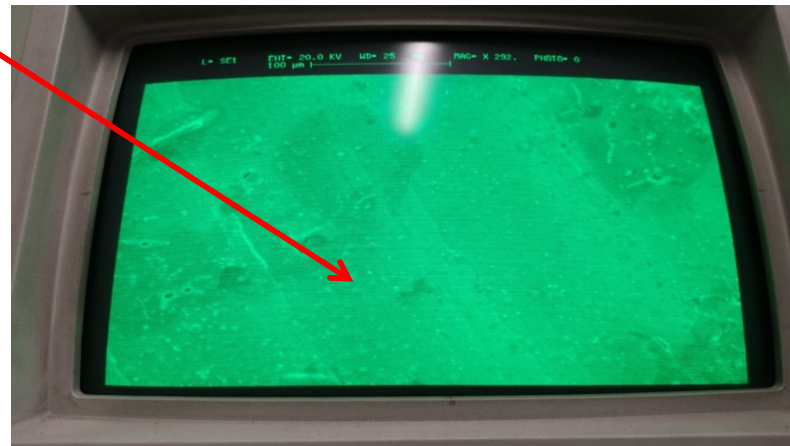
30µm

Electron Image 1



40µm

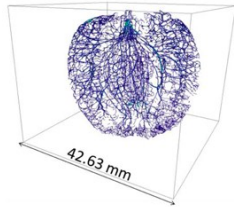
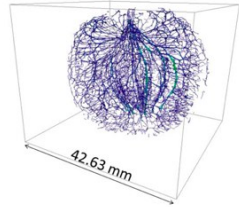
Electron Image 1



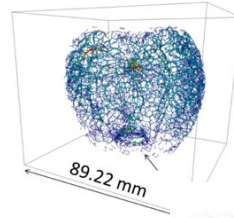
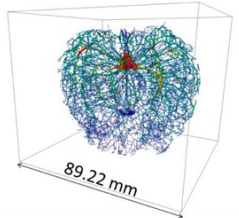
Vegetables

Manual segmentation

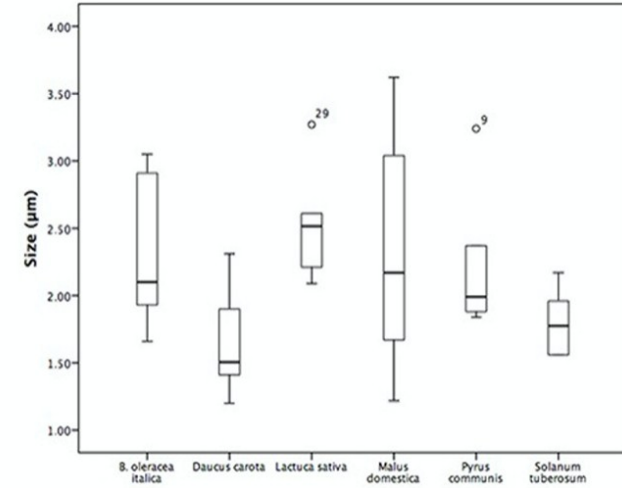
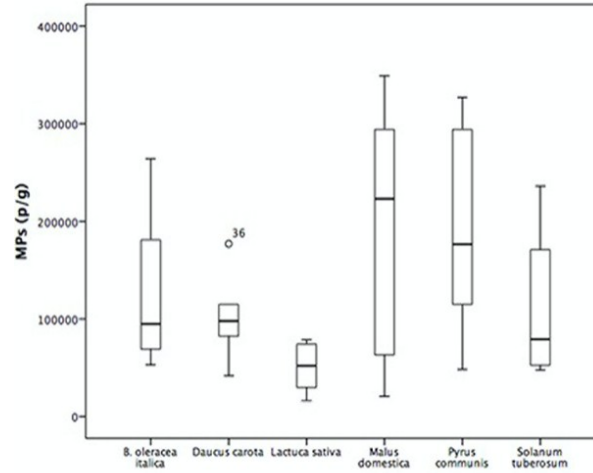
Automated segmentation



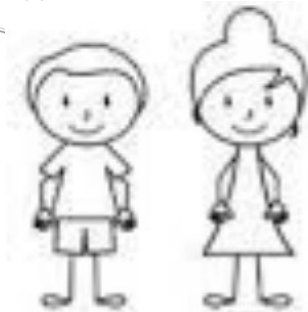
Week 12



Week 20



The **highest** adults' ($4.62 \text{ E}+05$) and children's ($1.41 \text{ E}+06$) **EDIs** are due to the ingestion of apples, instead the lowest are due to the ingestion of carrots (adults: $2.96 \text{ E}+04$; children: $1.15 \text{ E}+05$).



The mineral water application of the patent showed dramatic results available on Water research journal. More higher EDIs we estimated compared to all data available in current and past literature.



Water Research 162 (2019) 516



Exposure to microplastic mineral water consumption

P. Zuccarello, M. Ferrante^a, A. Cr G. Oliveri Conti

Environmental and Food Hygiene Laboratories, Depart

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Mineral water
Public health
MPs release
Principal component analysis



Comment

Comment on "exposure to microplastics (<10 μ bottles mineral water consumption: The first c Zuccarello et al. [Water Research 157 (2019) 3]

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^f Leibniz Institute of Polymer Research Dresden, Dept. Analytics - Group Microplastics, Dresden, Germ

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ABSTRACT

Microplastics in food is a relatively new have been pointing out that some of these studies apply questionable analytical methods. Nevertheless, media often use such results to gain attention of the readers. It is therefore of particular significance, that only those scientific studies are published, clearly presenting valid data on the content of microplastics in food. Unfortunately, the study by Zuccarello et al. shows very critical aspects regarding analytical

Water Research 166 (2019) 115077



Contents lists available at ScienceDirect

Water Research

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



Comment

Reply for comment on "Exposure to microplastics (<10 μm) associated to plastic bottles mineral water consumption: The first quantitative study by Zuccarello et al. [Water Research 157 (2019) 365–371]"

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ABSTRACT

Microplastics (MPs) are a threat to both the environment and human health. In the absence of an official method that would allow the analysis of all MPs with diameters less than 10 μm, it was not possible to estimate the exact exposure to these contaminants, yet. In the last years, few studies are available in literature with the first data concerning the concentrations of MPs on bottle mineral waters. Zuccarello et al. (2019) carried out an exposure assessment study where a high value of EDI (Estimated Daily Intake) has been reported. This rebuttal letter aims to reply to the comments of Oßmann et al. (2018) on the article of Zuccarello et al. (2019) about the new analytical method and both the use and the interpretation of Principal Component Analysis.

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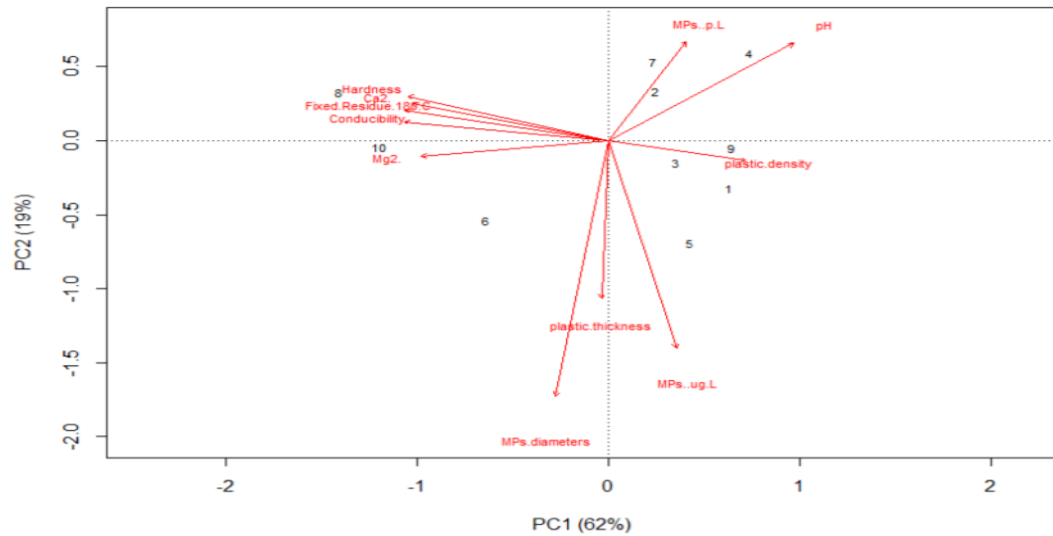
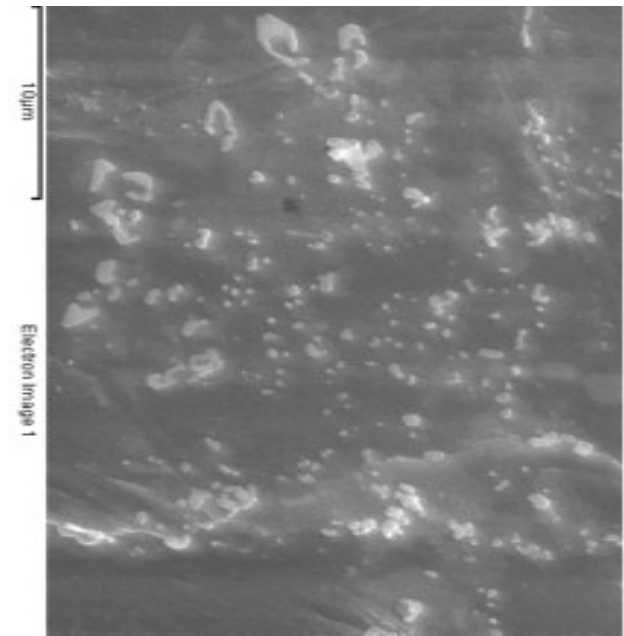


Figure 6. PCA on distance matrix



The *Estimated Daily Intakes* for and were:

Adults: 1,531,524 p/kg/body-weight/day corresponding to **40.1 µg/kg/body-weight/day**

Children 3,350,208 p/kg/body-weight/day corresponding to **87.8 µg/kg/body-weight/day**.



The deputy of the European parliament Ignazio Corrao, after knowing our first results, asked to EU more deeply control about microplastics in all foods.

 Parlamento europeo

29 gennaio 2019

Interrogazione con richiesta di risposta scritta E-000493-19
alla Commissione
Articolo 130 del regolamento
Ignazio Corrao (EFDD)

► **Oggetto:** Presenza di microplastiche nei vegetali a Catania

Una recente inchiesta giornalistica ha evidenziato i risultati di un'analisi chimica dell'Università di Catania, che mostra la presenza di sostanze tossiche (farmaci e veleni per animali) nei vegetali venduti nei mercati di Catania. Inoltre, è stata registrata la presenza di microparticelle plastiche all'interno dei tessuti di tutti i vegetali analizzati, indipendentemente dalla provenienza e dai metodi di coltivazione. I ricercatori sostengono che la causa sia l'acqua contaminata che arriva fino ai vegetali tramite il terreno. Le sostanze plastiche sono interferenti endocrini e possono cedere sostanze tossiche direttamente nel corpo umano, non hanno concentrazioni soglia e non ci sono limiti stabili, pur essendo potenzialmente cancerogeni e avendo forte impatto sulla fertilità e sulla salute del feto. La contaminazione da microplastiche è stata determinata dal Dipartimento di igiene di Catania grazie a un innovativo brevetto che, per la prima volta a livello internazionale, analizza in scala di micron.

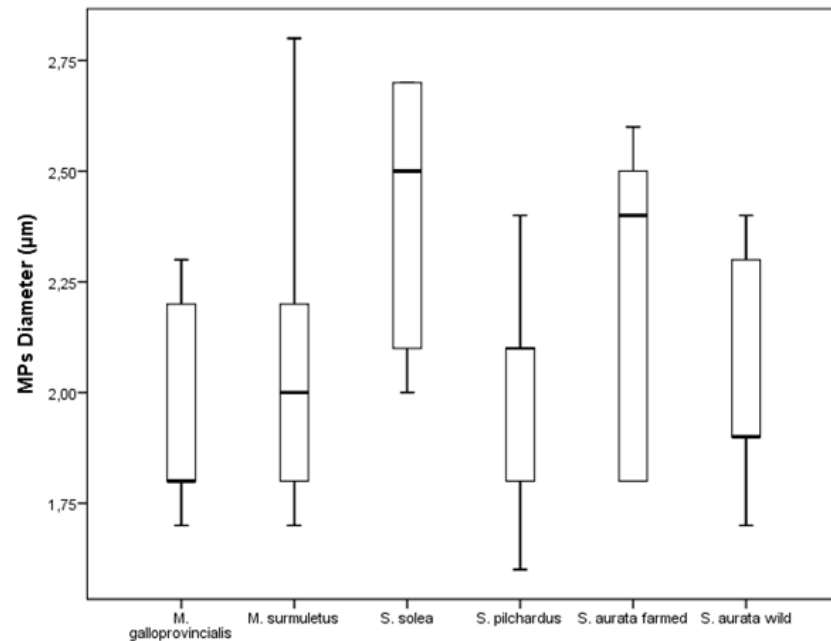
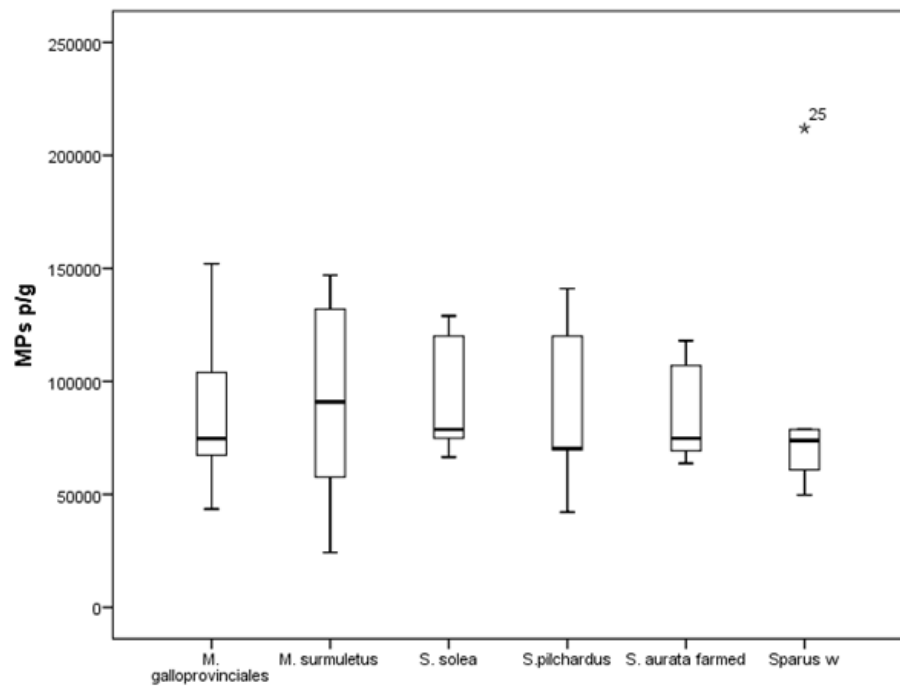
Può la Commissione far sapere:

- 1) Se è a conoscenza del caso in questione e di altri studi simili sulla presenza delle microplastiche negli ortaggi?
- 2) Quali strumenti normativi sono attualmente attivi per contrastare la presenza delle microplastiche negli ortaggi?
- 3) Come intende intervenire per tutelare la salute dei cittadini dai pericoli chimici rappresentati dalle microplastiche?

Ultimo aggiornamento: 5 marzo 2019




Ignazio Corrao



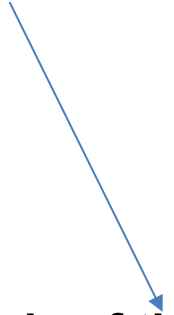
These aspect will be studied more deeply through the H2020- Plastour project proposal

The next our studies involve the
human tissues

H2020 project proposals



Understanding the imPact on human
HeAlth of eNviroNmenTal expOsures to
Micro and nanoplastics through the risk
analysis ***PHANTOM***.



Study of the possible role of
microplastics of environmental origin in
the etiopathogenesis of chronic
inflammatory bowel disease and
colorectal carcinoma. ***PLASTICROON***

