



UNIVERSITATEA
DE MEDICINĂ ȘI FARMACIE
„VICTOR BABES” DIN TIMIȘOARA



SPU
Slovenská
poľnohospodárska
univerzita v Nitre



Assessing How Environmental Pollutants Affect the Quality of Natural Ingredients in Skincare & Personal Care Products



**Co-funded by
the European Union**

ERASMUS KA220-HED - Cooperation partnerships in higher education

Project no. 2023-1-RO01-KA220-HED-000164767

Title: Partnership for innovation on the exchange of best practices and the design of joint collaborative initiatives at European level related to the awareness of the effects of contamination on human health

Acronym: INNO-SAFE-LIFE

Background & Relevance

- Rise in demand for **natural and organic beauty products**
- Consumer perception: “natural” = **safer, healthier, and eco-friendly**
- But: **Environmental pollutants** can compromise ingredient quality
- Growing concern in both scientific and regulatory communities

Key Environmental Pollutants

- **Heavy metals** (Pb, Cd, Hg, As) – soil and water contamination
- **Pesticide residues** – common in non-organic plant sources
- **Microplastics & POPs** – affect marine & mineral ingredients
- **Airborne pollutants** – PAHs, VOCs, industrial emissions

How Pollutants Enter Natural Ingredients

- Absorption through **roots, leaves, or raw mineral contact**
- Pollution in **harvest sites**: industrial zones, roadside farms, polluted waters
- Minimal purification or testing before entering production chain

Impacts on Ingredient Quality

- **Toxicological risks:** contaminants absorbed through the skin
- **Altered phytochemical composition:** reduced antioxidants, flavonoids
- **Decreased efficacy:** weaker anti-aging, soothing, or UV-protective effects
- **Reduced shelf life:** increased oxidation and degradation

Examples from the Literature

- *Green Tea Extract*: Lower catechin levels when grown in polluted areas
- *Carrier oils*: Jojoba and Argan oils show heavy metal contamination in industrial zones
- *Clays and Seaweed*: Microplastics found in marine-derived cosmetic ingredients
- *Chamomile and Calendula*: Pesticide residues in non-organic sources

Testing & Regulation Gaps

- **EU Cosmetics Regulation & ISO 16128** give basic safety/labelling standards
- Lack of **mandatory pollutant screening** at raw material stage
- No global consensus on environmental contamination limits in cosmetic inputs

Scientific Recommendations

- Source ingredients from **low-pollution or certified organic areas** Use **advanced testing methods**:
 - ICP-MS (heavy metals)
 - GC-MS (pesticides, VOCs)
 - FTIR (microplastics)
- Strengthen **supply chain traceability and transparency**

Industry Best Practices

- Invest in **clean cultivation** (vertical farming, controlled environments)
- Third-party certifications (COSMOS, Ecocert, USDA Organic)
- Use **geo-tagging or GIS** to track pollution risk at sourcing sites
- **Ingredient purification steps** before formulation

Conclusion



“Natural” doesn’t always mean “clean” or “safe”



Environmental pollutants threaten both **safety and efficacy** of skincare ingredients



Stricter regulation, advanced testing, and sustainable sourcing are essential to protect consumer health and brand integrity