

Practice abstract n°11: Policy Brief – PAPILLONS' Key Messages to European Institutions on Scientific Results, Remaining Knowledge Gaps and Policy Recommendations



The PAPILLONS project focuses on the risk of contamination from micro- and nanoplastics (MNPs) in European agricultural soils. One of its goals is to help society, and in particular policymakers, to prioritize measures to prevent this pollution. In March 2025, the project published a policy brief explaining the main results, highlighting research gaps, and giving advice to European Institutions at a crucial moment for the negotiations around a new directive for the monitoring of EU soils. The policy brief was also published in the last edition of the PAPILLONS magazine, which can be accessed for free.

1. Project Findings

The policy brief focuses on a series of significant milestones derived from the consortium's groundbreaking research work. The shared scientific findings include data and results from:

- Peer-reviewed studies recently published by PAPILLONS in high impact, international scientific journals;
- New findings from recently completed studies, for which scientific papers are currently in preparation.

While the latter have not yet undergone peer review, they were included in the paper when supported by robust statistical validation.

- The main conclusions from the research work, conveyed by the policy brief, are:
- Microplastics are the most abundant, widespread anthropogenic contaminant of European agricultural soils, with worst-case concentrations in excess of 0.1% by weight in the soil's top layer.
- Microplastics affect key soil properties and functioning at field conditions and realistic exposure levels.

- Microplastics at environmentally realistic conditions affect plant physiology, reduce chlorophyll content, and to some extent affect the growth of plants.
- Crops and soil-dwelling animals take up plastic and chemicals from soil and store them in edible parts.

2. Remaining knowledge gaps

The publication of this policy brief was also an opportunity to reflect and communicate to the European Commission on the remaining knowledge gaps and new emerging questions after the conclusion of the PAPILLONS project (May 2025). These elements provide a clear assessment of the state of play of scientific research in the field of MNP contamination of agricultural soils and contribute to identifying potential leads for future financing opportunities for research projects at the European level.

The remaining knowledge gaps identified are the following:

- **Understanding the degradability of biodegradable plastics** in different European soils is needed to prevent accumulation of residues affecting soil and food quality.



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- EU and national research programs should further **invest** in the development **of knowledge** on plastic contamination of soils from both agricultural and non-agricultural sources, the long-term fate of plastics and their chemical additives in soil, the accumulation of plastic and chemical additives in food.
- Long-term impact on soil health: while some effects on soil properties were observed in the short term, the evolution of these impacts over longer timescales and whether they could lead to irreversible **soil degradation should further be observed.**
- Cumulative and interactive effects: the **interaction of MPs with other agricultural pollutants** (e.g., pesticides, heavy metals) and their cumulative effects over multiple growing seasons require further investigation to assess compounding risks to soil and crop health.
- **Defining a “low plastic content” certification for biofertilizers:** this definition could be elaborated considering the requirement that the reiterated addition of the fertilizer during the long period will not result in a measurable increase of MP level in soil.

Conclusion and policy recommendations

The scientific results illustrated in the policy brief stress the urgent need for decisive action against plastic pollution to protect soil health, food safety, and human health. In this context, an EU-wide policy instrument is essential to ensure quality control, and to protect the competitiveness of food producers who invest in clean and sustainable agriculture.

Hence, PAPILLONS policy recommendations entail:

- The Soil Monitoring Law shall include MPs as critical soil contaminants. Monitoring should take place every five years to provide a useful level of control.
- National and European authorities shall enact actions to monitor evolution of MP levels in soils, identify source pathways and reduce emissions. They should also invest in further research on the topic.
- The use of biodegradable plastic in agriculture should be revised and informed by a complete risk assessment and risk management scheme (including strict, traceable certification and quality control/assurance practices).
- The EU should create a “low plastic content” certification for biofertilizers. Restriction or ban of practices known to cause substantial addition of plastic to soil should be considered.



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