

Beneath the orange fields: Impact of Glyphosate (herbicides) on soil organisms

Glyphosate and glyphosate based herbicides can harm soil organisms, which perform essential ecosystem functions. This is underlined in a [new brief of PAN Europe](#), summarising important findings from scientific literature.

“There is a misbelief that glyphosate-based herbicides are beneficial for agricultural production without having any negative consequences to beneficial species and soil health”, says Gergely Simon, chemicals officer at PAN Europe, “This is far from the truth. Apart from killing beneficial plants and [endangering important pollinators like bees](#), glyphosate can seriously disrupt soil health by harming the soil microbiome and earthworms”.

- Soils are estimated to harbour about 59% of Earth’s species, or even more, as soils are understudied. For example, **90% of fungi, 85% of plants and 50% of bacteria are living in soils.**
- Healthy soils provide a **wide variety of ecosystem services** such as biodiversity, nutrient cycling, sustainable plant production, natural pest control, good water quality, water and carbon storage and erosion management. **Soil micro- and macrofauna are essential contributors to these functions**, and harm to these organisms can impact essential soil functions.
- **Glyphosate and its metabolite AMPA are widely present** in our environment, and the most frequently found pesticide residues in **soils** across Europe.
- The **persistence** of glyphosate in soils can vary from low to very high, depending on environmental conditions and properties.
- Glyphosate inhibits the **shikimate pathway**. This pathway, responsible for essential aromatic amino acid biosynthesis, is **present in plants and algae, but also in fungi and bacteria in soils and in the gut microbiome of animals and humans.**
- Inhibition of this pathway leads to the **death of plants**. Given the same pathway is present in fungi and bacteria, researchers have looked at the impacts of glyphosate and GBHs on microorganisms.
- GBHs can harm the **soil microbiome**:
 - GBHs can **alter the composition and abundance of soil microorganisms** (bacteria and fungi), and for example **increase pathogenic and decrease beneficial organisms.**
 - GBHs can **reduce** the forming of mutually beneficial relationships between fungi and plant roots, called **root mycorrhization**, which can impact plant health/growth
 - Research has shown GBHs can lead to changes in **nutrient composition** in the roots, leaves, grape juice and xylem sap
 - Scientists warn that microbiomes play an essential role in maintaining ecosystems health, and that **microbiome alterations can have unforeseen impacts on functioning of organisms and ecosystems.**

Pesticide Action Network (PAN Europe) is a network of NGOs working to reduce the use of hazardous pesticides and have them replaced with ecologically sound alternatives. We work to eliminate dependency on chemical pesticides and to support safe sustainable pest control methods. Our network brings together over 45 consumer, public health and environmental organisations and women’s groups from across Europe.



Press Release

- Research also points at the importance of the possible links between the impact exposure to GBHs and other pesticides on the gut **microbiome of animals and humans, and impacts on animal and human health, including cancer and neurological disorders.**
- GBSs can harm **earthworms**:
 - Research shows **glyphosate contamination is common in earthworms.**
 - GBHs can severely **negatively impact survival, body mass, microbiome and behaviour of earthworms**
 - Negative impacts on earthworms reach far beyond soils, for example, use of pesticides and fertilisers have been found as one of the main drivers for drastic declines in **farmland birds**, especially for invertebrate feeders.
- While there is a need for more long-term, detailed studies to further untangle possible impacts on soil life and highly complex processes, GBHs **can clearly harm organisms and disrupt** ecosystem functions, the **very foundation on which safe and sustainable agricultural production depends.** Furthermore, the use of GBHs poses a threat to the health of farmers and the general public.
- **Fortunately, there are viable [alternatives to GBHs](#), that are aligned with climate and pest resilient and nature-inclusive cropping systems, offering extensive benefits for ecosystems and citizens' health, farmers wellbeing and food security.**
- The [EU assessment](#) has [major shortcomings and data gaps](#), particularly in assessing the impact of glyphosate and glyphosate products on biodiversity and microbiome. **It incorrectly concludes that glyphosate is safe.** This contradicts the provisions of the pesticide EU law and the implementation of the precautionary principle, which both prioritise a high level of human and the environment, including biodiversity and ecosystems.

GBHs indiscriminately kill all plants and harm various organisms, including bees and soil organisms. “**Overall, GBHs can disrupt ecosystem functions which are essential for a variety of public goods and sustainable food production**”, says Kristine De Schampelaere, policy officer at PAN Europe.

The EU is currently in the process of renewing the approval of glyphosate, with its current licence set to expire at the end of 2023. **Unfortunately the [EU assessment](#) has [major shortcomings and data gaps](#), particularly in assessing the impact of glyphosate and glyphosate products on biodiversity and microbiome. It incorrectly concludes that glyphosate is safe.** This contradicts the provisions of the pesticide EU law and the implementation of the precautionary principle, which both prioritise a high level of human and the environment, including biodiversity and ecosystems.

Contact PAN Europe, Gergely Simon, +36 20 252 9212, gergely@pan-europe.info
Kristine De Schampelaere, +32 473 96 11 20, kristine@pan-europe.info
Tjerk Dalhuisen, +31 614 699 126, tjerk@pan-europe.info

Pesticide Action Network (PAN Europe) is a network of NGOs working to reduce the use of hazardous pesticides and have them replaced with ecologically sound alternatives. We work to eliminate dependency on chemical pesticides and to support safe sustainable pest control methods. Our network brings together over 45 consumer, public health and environmental organisations and women's groups from across Europe.

