The impact of glyphosate on soil health

A summary of the evidence to date

Glyphosate and life in the soil

Over the last decade, about 6.1 billion kilograms of the herbicide glyphosate have been sprayed on the world's farms, gardens and public spaces. Although previously thought harmless, in 2015 it was classified as 'probably carcinogenic to humans' by cancer experts at the World Health Organization.

As the effects of glyphosate on human health come under scrutiny, scientists are now concerned that we don't know enough about the ecological safety of glyphosate, how it interacts with the natural environment and living organisms, and what happens as it breaks down.

The Soil Association has reviewed the science on the impact of glyphosate on soils and soil life. For the world's most widely sold weed-killer, we found surprisingly little research has been done. What research there is shows contrasting results, significant uncertainty and some evidence that glyphosate causes harm. More research is urgently needed.

The evidence

Glyphosate has been thought safe for the environment because it is inactivated quickly after spraying as it is absorbed onto soil particles. It is also broken down by soil-micro-organisms, such as bacteria and fungi, that use glyphosate as a food source.

However, our review found that studies suggest that the picture is more complicated and uncertain, and the potential for harm may be higher.

Key findings

Leaching into water:
It was understood that the risk of glyphosate leaching deeper into the soil or groundwater, rivers or lakes was low due to its ability to attach to soil particles. However, studies have shown that in certain circumstances, such as in particular types of soil or weather conditions, glyphosate can leach out and poses a potential pollution threat to water courses.

Impact on soil micro-organisms:
To date scientific studies about the impact of glyphosate on soil micro-organisms have provided contrasting results. Some have not found any threat from glyphosate, whilst other research shows effects that are of concern to scientists. These include impacts on the diversity, function and structure of the communities of microbes that live in the soil, and that are vital to soil health, especially when the herbicide is used regularly.

Impact on fungi:
Fungi that live near plant roots and provide crops with nutrients and access to water, and help protect against drought and disease, have been found to be harmed by the use of glyphosate.

Severity and occurrence of crop diseases:
It is now reported that using glyphosate has increased the severity or the re-emergence of crop diseases, potentially by changing the balance between beneficial and harmful microbes in the soil. Increased frequency of soil-borne pathogens and reduced ability of crops to defend against them, are both reported as problems resulting from glyphosate use.

Impact on earthworms:
Whilst at least two studies found no problems, at least six others found that glyphosate had a negative impact on the reproduction, movement or activity of different species of earthworms.

Ignorance of Impacts

Our understanding of the impact of glyphosate on soil and soil life is far from conclusive. Scientists are concerned about crop diseases, effects on earthworms, micro-organisms and ecosystems and are calling for further research. Given how long glyphosate has been in use, it is extraordinary how little is known about its environmental impact. Given the continuing widespread and heavy global use of glyphosate, this ignorance – and indications of potential problems- add weight to the demands for a ban on the use of glyphosate based on the threat it poses to human health.

Further research needed on: the impact on soil-life including nematodes, ants, beetles, termites, spiders, arthropods, molluscs and protozoa

- the 'knock-on' effects of changes in the soil ecosystem
- the impact of glyphosate on its own and when combined with other ingredients in commercial products
- whether there is a significant build-up of AMPA in soils and if so, whether this is problematic (this chemical compound is produced when glyphosate is broken down and is considered mildly toxic to plants)
- the use of glyphosate on crops immediately before harvest, and in public spaces.

References

For references please see the full report on glyphosate and soil at *www.soilassociation.org/glyphosateandsoil*

Contact

South Plaza
Marlborough Street
Bristol BS1 3NX

t +44 (0)117 314 5000

Soil Association Scotland
3rd Floor
Osborne House
Osborne Terrace
Edinburgh EH12 5HG

t +44 (0)131 666 2474
f +44 (0)131 666 1684

www.soilassociation.org

@SoilAssociation

facebook.com/soilassociation