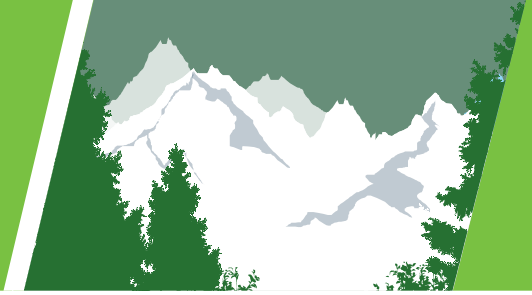
Glyphosate and the Environment



Glyphosate has **many favorable environmental characteristics,** making it suitable for sustainable agriculture, land management and wildlife restoration projects.

Non Volatile

// Glyphosate is non-volatile [1], meaning it is highly unlikely to move off-site as a vapor to damage off-site vegetation.

Soil Binding

// A key environmental property of glyphosate is that it binds tightly to soil [2]. This characteristic reduces its bioavailability immediately after use, allowing it to be used safely at planting, or adjacent to existing crops, without damaging the crops. The tight binding also limits movement through the soil, meaning its unlikely to affect off-site non-target plants by runoff, and minimizes any presence in groundwater.

Microbial Degradation

// Glyphosate is biologically degraded over time by soil microorganisms into naturally occurring products, including carbon dioxide and phosphate. The rate of degradation depends on the soil type, microbial content and environmental conditions, such as temperature with an average half-life across many locations of about a month.

Bioaccumulation

// Glyphosate does not bioaccumulate thus does not magnify through the food chain. Studies in animals show that there is minimal retention of glyphosate in tissues, and that if exposure were to occur, the glyphosate would be rapidly eliminated.

Soil Organisms

// The effects of glyphosate to soil microorganisms and macroorganisms (e.g., earthworms, collembola) [3] have been extensively evaluated and shown not to pose a risk at environmentally relevant concentrations [4]. Some bacteria and fungi are sensitive to glyphosate, but observed effects have been minor and reversible. Studies conducted with annual applications for up to 19 years have demonstrated that glyphosate showed no effects on soil biomass, or microbial respiration [2], [5].

1 EPA, 1993. Reregistration Eligibility Decision. https://www3.epa.gov/pesticides/chem_search/reg_actions/reregistration/red_PC-417300_1-Sep-93.pdf

2 Giesy, J.P., Dobson, S., Solomon, K.R., 2000. Ecotoxicological risk assessment for Roundup herbicide. Rev. Environ. Contam. Toxicol. http://www.usask.ca/toxicology/jgiesy/pdf/publications/JA-228.pdf

3 Levine, S.L., 2014. Glyphosate & Earthworms. GMOAnswers. https://gmoanswers.com/ask/i-had-someone-tell-me-roundup-kills-earthworms-true-or-false

4 von Mérey, G., Manson, P.S., Mehrsheikh, A, Sutton, P, Levine, S.L., 2016. Glyphosate and aminomethylphosphonic acid chronic risk assessment for soil biota. Environmental Toxicology and Chemistry. https://doi.org/10.1002/etc.3438

5 Hart, M.R. and Brookes, P.C., 1996. Soil microbial biomass and mineralization of soil organic matter after 19 years of cumulative field applications of pesticides. Soil Biol. Biochem. http://www.sciencedirect.com/science/article/pii/S0038071796002490