

Hard water and Roundup®



A range of factors can influence the final efficacy of glyphosate in the field. Hard water is one of the factors well known to affect performance because the glyphosate anion can readily chelate polyvalent cations (e.g. Ca^{2+} , Mg^{2+} , Fe^{2+} , Fe^{3+}) freely available in the water, forming metal salts which render the glyphosate biologically inactive and reduce the herbicidal effect of the dilute spray solution. The sophisticated formulation system in Roundup® branded products can buffer these effects in all but the most extreme situations

- // Water conditioners are not necessary to support the technical performance of the modern Roundup® formulations, other than in exceptional circumstances
 - // Water drawn from the mains in very hard water areas can reduce the performance of Roundup®, but it will likely only be noticeable at low rates of use (<720g glyphosate) and/or in high water volumes (200L/ha+) where the ion content is high. In this scenario, use of a true water conditioner is advised, even with Roundup® branded product
 - // At exceptional water hardness in excess of 1000ppm (e.g. abstracted from boreholes), performance of Roundup® will likely be impaired and variable, particularly noticeable on perennial weeds. The advice would be to avoid using water abstracted from boreholes, rather using an alternative source, even hard water from the mains in the worst case.
- // Be aware this flexibility does not necessarily apply to competitor glyphosate products
 - // The performance of competitor glyphosate formulations can be less reliable and more variable in hard water situations; it may well be appropriate to more routinely factor in use of a water conditioner in this case
- // If using a water conditioner, be sure to:
 - // add the correct dose of the chosen product to ensure sufficient chelating agent is available in the water to neutralise the problem
 - // fill the sprayer to about 90% capacity, then add the water conditioner to the spray tank and thoroughly mix first, before adding any glyphosate product
- // Typically hard water and high pH occur together
 - // Bayer trials show no adverse effect on performance of Roundup® using water between pH 4 - 8 since the formulations will ordinarily form acid spray solutions of pH 4 - 5
- // **Harvested rainwater** is the preferred source of water for spraying glyphosate
 - // If using mains water, but sure to test for water hardness
 - // Beware using water from an alternative source (e.g. ditch) is likely to include suspended soil / clay particles; these too can lock-up glyphosate, reducing the effective dose available in the spray solution
- // Remember to use an **appropriate dose** of Roundup®, applied **carefully** in the **minimum necessary water volume** to deliver the strongest field performance

