How to get the best performance

Optimum conditions for control of weeds with Roundup®

Roundup® is a registered trademark of the Bayer Group. Roundup® contains glyphosate.

Use plant protection products safely. Always read the label and product information before use. Pay attention to the risk indications and follow the safety precautions on the label.

For further details consult the website

Web: https://cropscience.bayer.co.uk/our-products/amenity

Having chosen the best product for the job by choosing Roundup®, the very best results can be achieved by a deeper understanding of other factors which may affect the final weed control results. These factors fall into three main areas; plant, climate & application.

Plant - Species

Certain species are less susceptible to Roundup® e.g. legumes, like Wild White Clover, Equisetum & Ivy. This may be caused by a physical barrier e.g. thick waxy cuticles, hairy surfaces or by a growth habit which provides a poor target such as small leaves. Species also vary in the speed they react to glyphosate. Most notable are the slower symptoms on broad-leaved plants when compared to grasses.

2 weeks after spraying

4 weeks after spraying

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Plant - Resistance

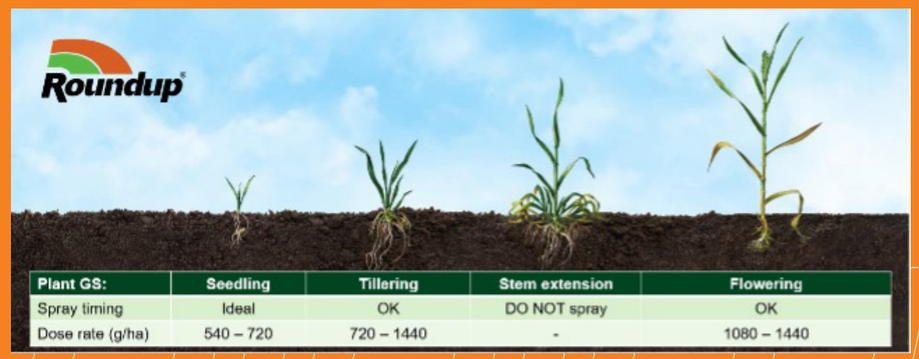
A plant is only defined as resistant to glyphosate when dose rates which used to give good control no longer work and this characteristic is heritable i.e. handed down to the next generation.

Poor control in the field is often explained by other factors. Grass-weeds and Italian rye-grass particularly are at highest risk of resistance development, with the first case of resistance in a UK field population of Italian rye-grass reported by WRAG in January 2025. There is no room for complacency and users need to be vigilant to the risks, especially if the system is highly reliant on glyphosate in the absence of using other modes of action or alternative methods of weed control. The chances of resistance developing are higher if used in sub-optimal circumstances (eg. poor timing, compromised dose rate, poor application practice).

Resistance is not the same as tolerance where some species are not controlled by leaf uptake of label doses, usually due to poor uptake through waxy cuticle e.g. Equisetum, Ivy, Gorse. But unlike resistant plants these species can be controlled if glyphosate is directly applied e.g. stump treatment, chemical thinning or stem injection.

Plant - Growth stage / timing

Glyphosate only controls weeds present at the time of application and has no effect on seedlings which emerge after treatment. Ensure weeds are green and growing to ensure uptake and translocation. Annual weeds should have at least one pair of true leaves and grasses 5 cm growth before spraying begins. Poorest translocation will occur during the stem extension phase of growth. This is particularly marked in perennial broad-leaved weeds but can also be important for fast growing annuals. The natural flow of sugars from photosynthesis in the leaf is upwards to the fast extending stem for use in the developing flower. Treatment at this time which is often in early spring can lead to a dieback of the stem but subsequent re-growth from the base. This can be seen in Rosebay Willowherb, Ragwort, Creeping Thistle, Canadian Fleabane, Japanese Knotweed, Stinging Nettle and Ryegrasses. Once the flowers are formed the next physiological stage for perennials is to move sugars back down to the roots for storage. Spraying at this time will give excellent translocation down to the roots and a much higher level of kill. Where programmes involve early spring treatments perennials will be knocked back but should be treated again later in the season for complete control.



Plant GS:	Seedling	Tillering	Stem extension	Flowering
Spray timing	Ideal	OK	DO NOT spray	OK
Dose rate (g/ha)	540 – 720	720 – 1440	-	1080 – 1440

Plant - Activity / stress

Reduced metabolism, for whatever reason leads to reduction in transport to the growing points and will lead to poor results. Stress can be from extremes of temperature hot or freezing, seasonal die-back, waterlogging, drought or systemic disease like viruses. A reduced leaf target can result in areas in close proximity to traffic during prolonged dry spells. Plants lay down thicker waxy cuticles to reduce moisture loss from the drought, plus debris and dust builds up on the leaf surface, physically preventing efficient uptake. Foliar disease like leaf spotting, mildew, rusts and pest infestation like aphids also reduce the effective target area of leaf.

Climate - Temperature

Moderate temperatures favour efficacy, 15-25C. Low temperatures even a light transient frost can still give a slow, but good kill. Spraying can continue through the winter as long as the frost will lift during the day. Symptoms may take 4 weeks in winter because the whole process is temperature dependent. Hard/long-term frosts, when the plants go floppy and the metabolism shuts down, will lead to poor uptake and poor performance. High temperatures can cause stress in the target plants, shutting down the stomata, leading to poor uptake. Avoid spraying in hottest part of day during a UK heat wave. High temperatures combined with low water volumes can mean droplets evaporate very quickly even as they fall & afterwards on the leaf surface, resulting in scorch and poor translocation within the plant.

Climate - Humidity

High humidity or even a light drizzle leads to good control, as long as run-off is minimal. The stomata are open and uptake is both direct & indirectly through leaf cuticle. Application in the morning onto dew or in fog, will be effective as long as it dries out in day. Avoid spraying in evenings where there is a high risk of run-off from night-time rainfall because drying time is prolonged.

Climate - Rainfall

Rain before spraying leaving wet leaves is not a problem, but rain after spraying, before uptake can lead to very poor results (40-60% of control without rain). Most generic glyphosate formulations require 6-24 hours of dry weather after spraying but modern Roundup® formulations, support rain-free periods from just 1 hour on Annual grasses and Couch and 4 hours for all Perennial broad-leaved weeds. The type of rain which occurs soon after spraying may also make a difference for instance up to 2 mm in short shower or light drizzle will have only a minimum effect and will not require a re-spray, however 4-8 mm of frontal rain or a thunderstorm will cause wash-off and would require re-spraying. Rainfall challenges performance most when restricted by other factors.

Climate - Light

Best results come from morning applications, due to the long light period before darkness stops the movement around the plant.
The quickest results are seen in high light intensity, long days which maximise the movement throughout the plant. Slowest results from evening or night application and run-off can still occur from rainfall overnight if the glyphosate was not taken up before dark. Do not bury or cover (cultivate/ apply lime or horticultural mulch/ plastic membranes) for at least 5 days after treatment as they all cut out light and stop translocation of glyphosate to the growing points, especially in perennials and will lead to poor control.

Climate - Air movement

Spray when Wind speed is Force1-3, (1.2-6mph) and direction is away from susceptible vegetation. Glyphosate is non-volatile and will not lift from target areas in high temperatures like some hormones but avoid temperature inversions where cool air is trapped under warm air. Droplets can behave in unpredictable ways and move away from the target area.

Application - Volumes

Hydraulic sprayers, 80-250 L/ha. Lower volumes usually give best results. Run–off occurs at around 400l/ha. Take care when mixing with residuals which require high water volumes. Follow labels for volumes for other specialist uses e.g. selective weed wipers, stem injection, cut stump.

Application - Volume / rate interaction

Low rates lead to a low concentration of glyphosate and surfactant. Higher rates in high water volumes (>250L/ha), still lead to droplets with a low concentration of glyphosate, and both of these can lead to poorer results, especially in conjunction with hard water or other sub-optimum conditions. Low water volumes give good results providing correct nozzles are used, but rates should not be cut. High temperatures and low volumes together can cause problems and there are fewer margins for operator error with low volumes. Correct calibration is vital for swath width and boom height as well as walking speed. Halving boom height doubles the application rate.

Application - Spray quality

Conventional sprayers

Medium-coarse BCPC (200-400 microns). Use low drift flat fan even-spray nozzles or Polyjet/anvil in knapsacks. Avoid driftable fines (< 100 microns) by never using cone nozzles and fit pressure regulators to avoid over-pressurising hand pumps. Larger drops have a longer liquid phase which helps direct uptake through stomata. Use droplets on finer side of medium for optimum wetting of hairy plants like nettles. Fine droplets on a hot day result in concentrated drops through evaporation in the air, leading to more scorch and less uptake.

Application – Dose rate

Make sure the correct dose rate is chosen for the most difficult to kill target weed. If all other factors are optimal lower dose rates may work, but sub-optimum dose rates will give less reliable results, especially if other conditions are also less than perfect.

Application – Hard water

In many areas of central and Eastern England mains water is ‘hard’ and contains high levels of dissolved calcium and magnesium ions. Glyphosate can be locked up (chelated) by these ions reducing the effective dose rate. The effects are most obvious where low rates and high water volumes are used. Modern Roundup® formulations perform better in hard water situations than many APE based glyphosate generics.

Conclusions

Knowledge of the ideal conditions can help maximise satisfaction with Roundup® by ensuring spraying takes place only when as many factors as possible are conducive to best results and can prevent wasteful applications when conditions mitigate a satisfactory kill. Importantly, it can also help to diagnose the cause when problems arise and results do not meet expectations.