

GLYPHOSATE

Kernel™

Herbicide

A non-residual non-selective herbicide for professional use for the control of annual and perennial broad-leaved and grassy weeds.

A soluble concentrate containing 480 g/l glyphosate present as 640 g/l (53.5 % w/w) of the isopropylamine salt and tallow alkyl amine ethoxylate.

FOR USE ONLY AS A NON-SELECTIVE AGRICULTURAL, HORTICULTURAL AND FORESTRY HERBICIDE

Application	Maximum Individual Dose	Maximum Number of Applications	Latest Time of Application
Pre-harvest — cereals:	3.0 litres/ha	1 per season	7 days before harvest
Pre-harvest — oilseed rape:	3.0 litres/ha	1 per season	14 days before harvest
Pre-harvest — peas and beans:	3.0 litres/ha	1 per season	7 days before harvest
Pre-harvest — linseed:	3.0 litres/ha	1 per season	7 days before harvest
Stubbles:	3.0 litres/ha	1 per season	14 days before drilling
Set-aside:	3.0 litres/ha	1 per season	n/a
Grassland:	4.5 litres/ha	1 per season	5 days before cutting or grazing
Forestry (weed control):	7.5 litres/ha	1 per season	n/a
Non-crop land:	4.5 litres/ha	1 per season	n/a
Orchards (apples, pears, plums, cherries, damsons):	3.75 litres/ha	1 per season	7 days before planting. After leaf-fall but before 'green cluster' (apple, pear); After leaf-fall but before 'white bud' (plum, cherry, damson)
Aquatic use (emergent weeds):	4.5 litres/ha	1 per season	n/a

For full Directions for Use please see the attached leaflet.



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This booklet is an approved label for the product with which it is supplied. The label and leaflet must be read before use and complied with at all times.

DIRECTIONS FOR USE

General Information

Kernel is a water-soluble, non-selective, non-residual herbicide for the control of most annual and perennial grasses and broad-leaved weeds.

Kernel is translocated from the treated leaves throughout the plant and to underground roots, rhizomes and stolons. Symptoms such as gradual wilting and yellowing of foliage are rapidly visible in grass weeds but are slower to appear in broad-leaved weeds.

Restrictions

1. Weather Conditions

For best results a rain-free period of 6 hours (and preferably 24 hours) is required after application of Kernel.

Kernel should not be sprayed under windy conditions as spray drift may cause severe damage or destruction of neighbouring crops. Action of Kernel will be slower in cooler weather. It should not be used under frosty conditions while weed growth is reduced by natural senescence.

Treating weeds which are suffering from drought stress may result in reduced efficacy.

2. Associated farming practices

Do not apply lime, fertilisers or other pesticides for at least 5 days before and after the application of Kernel.

3. Following Crops

Kernel is inactivated on contact with soil by binding to soil particles.

All crops may be planted or sown at the intervals specified in the Directions for Use' following treatment. A slight growth retardation following germination may be seen if seeds are sown by direct drilling amongst decaying vegetation, roots, rhizomes or stolons.

4. Mixing and Application

DO NOT STORE, MIX OR APPLY THIS PRODUCT FROM AN UNLINED OR GALVANISED STEEL TANK. Do not leave mixtures in spray tanks over long periods. Ensure that spray tanks are always thoroughly ventilated.

NEVER APPLY PRE-HARVEST TREATMENTS TO CROPS GROWN FOR SEED. Barley intended for brewing and contract-grown crops should only be treated following approval from the grain merchant. Consult processor before using on crops intended for processing.

Weed control

It is important when treating perennial weeds that there is full emergence of healthy green foliage and active growth at the time of application.

The efficacy of this product is increased if the leaf surface for absorption is large. Scutch (couch grass) is particularly susceptible at the 4-5 leaf stage, where there is about 10-15 cm of new growth, when tillering and new rhizome growth is starting.

Most perennial broad-leaved weeds are particularly susceptible to treatment when they are actively growing and shortly before flowering. Annual weeds should be growing actively at the time of treatment. Grasses should have at least 5cm of growth. Broad-leaved weeds should have at least two sizeable true leaves.

Under conditions of drought, flooding, frost of high temperatures, disease or insect damage or weeds heavily covered with dust, where plant growth is restricted the efficacy of this product will be reduced.

Weed Resistance Strategy

Stains of some annual weeds (e.g. Black-grass, Wild-oat, Italian Ryegrass) have developed resistance to herbicides which may lead to poor control. A strategy for managing such resistance should be adopted, and should include integrating herbicide use with a programme of cultural control methods.

Do not use glyphosate repeatedly over several years in the same field as selection of resistant weeds can take place and may become dominant.

ARABLE APPLICATION

To improve efficacy when KERNEL is used at dose rates of 1.5 l/ha or less add a suitable adjuvant to the spray tank. Do not add an adjuvant if the product is to be applied using a rotary atomiser sprayer.

Crops

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CONDITIONS FOR USE

Crops	Maximum Dose	Maximum number of treatments	Pre-harvest interval or latest application time
Wheat, barley, oats	3 l/ha	1 per crop	7 days before harvest
Oilseed rape	3 l/ha	1 per crop	14 days before harvest
Combining peas, Field beans	3 l/ha	1 per crop	7 days before harvest
Linseed	3 l/ha	1 per crop	7 days before harvest
Stubbles of all crops	3 l/ha 1.125 l/ha	1 per crop 1 per crop	5 days before drilling 2 days before drilling

Please refer to the following tables for specific details:

ARABLE APPLICATION, stubbles of all crops and pre-cultivated land

Area of Use	Target Weeds	Extent of Weed Infestation	Application Rate in l/ha	Water Volume	Application Details
Pre-harvest wheat (including Durum wheat) barley and oats	Scutch (Couch)	<25 shoots/m ²	1.5 (+)	Hydraulic Sprayers 80-250 l/ha	Apply when the moisture content of the crop grains is less than 30%, and at least 7 days before harvest. Use high clearance tractors with narrow wheels and crop dividers. NEVER TREAT CROPS WHICH ARE GROWN FOR SEED. Treated straw should not be used for horticultural mulch but may be used for all other applications. Following harvest, incorporate or remove straw, thereafter treated area may be used for further cultivation.
		26 to 75 shoots/m ²	2.25		
		>75 shoots/m ² in direct drilled crops	3.0		
	Perennial broad-leaved weeds, and other perennial grasses	All species at all levels of infestation	3.0		
Pre-harvest in cereals for harvest management	Annual grasses cereal stems and leaves	All species at all levels**	0.75 (+)	Hydraulic Sprayers 80-250 l/ha	Apply when the moisture content of the crop grains is less than 30%, and at least 7 days before harvest and up to 14 days before harvest. Use high clearance tractors with narrow wheels and crop dividers. DO NOT TREAT CROPS WHICH ARE GROWN FOR SEED. Treated straw should not be used for horticultural mulch but may be used for all other applications. Following harvest, incorporate or remove straw, thereafter treated area may be used for further cultivation.
	Annual broadleaved weeds		1.125 (*)		
Pre-harvest of oilseed rape	Crop desiccation prior to combine harvesting	-	2.25	Hydraulic sprayers at 200-250 l/ha	Apply when seeds contain less than 30% moisture. Apply to standing crop 14-21 days before harvest. Use high clearance tractors with narrow wheels and crop dividers. DO NOT TREAT CROPS WHICH ARE GROWN FOR SEED. For effective combining do not treat crops with a significant amount of secondary growth nor treat areas of crop with delayed maturing caused from damage by poor drainage or birds. Extreme heat, drought or disease may cause crops to mature unevenly after treatment. After treatment straw should be incorporated or removed, thereafter treated area may be used for further cultivation.
	Scutch (Couch)	<75 shoots/m ²	2.25		
	Annual weeds	All species at all levels	2.25		
	Scutch (Couch)	>75 shoots/m ²	3.0		
	Perennial broad-leaved weeds Other perennial grasses	All species at all levels	3.0		

(+) Use adjuvant for optimum results. See 'Crops' above.

Area of Use	Target Weeds	Extent of Weed Infestation	Application Rate in l/ha	Water Volume	Application Details
Pre-harvest use on combining peas and field beans	Scutch (Couch)	<75 shoots/m ²	2.25	Hydraulic sprayers 80-250 l/ha	Apply at least 7 days before harvest to crop seeds containing less than 30% moisture. DO NOT TREAT CROPS WHICH ARE GROWN FOR SEED. This treatment must not be used for crop desiccation. Use high clearance tractors with narrow wheels and crop dividers
	Scutch (Couch)	>75 shoots/m ²	3.0		
	Perennial broad-leaved weeds Other perennial grasses	All species at all levels	3.0		
Pre-harvest use on linseed	Scutch (Couch)	<75 shoots/m ²	2.25	Hydraulic sprayers 80-250 l/ha	Apply at least 7 days before harvest to crop seeds containing less than 30% moisture. A period of 28 days may be necessary before combine harvesting. DO NOT TREAT CROPS WHICH ARE GROWN FOR SEED.
	Scutch (Couch)	>75 shoots/m ²	3.0		
	Perennial broad-leaved weeds Other perennial grasses	All species at all levels	3.0		
Autumn and spring application to stubbles of all crop	Scutch (Couch)	<75 shoots/m ²	2.25	Hydraulic sprayers 80-250 l/ha	Drilling, direct drilling or cultivation may take place 14 days after spraying. For best results allow sufficient weed growth before spraying. In spring a period of at least 21 days of weed growth should be allowed prior to treatment. NEVER CULTIVATE BEFORE SPRAYING
	Scutch (Couch) Other perennial grasses Autumn volunteer potatoes	>75 shoots/m ² All species at all levels	3.0		
Stubbles of all crops and land prior to cultivation	Volunteer cereals, other annual grasses, annual broad-leaved weeds	All species at all levels	1.125 (+)	Hydraulic sprayers 80-250 l/ha	Direct drilling or cultivation may take place 14 days after spraying. NEVER CULTIVATE BEFORE SPRAYING

(+) Use adjuvant for optimum results. See 'Crops' above.

GRASSLANDS

KERNEL should be applied at a maximum rate of 4.5 l/ha once per year at least 5 days before harvest, grazing or drilling.

Area of Use	Target Weeds	Extent of Weed Infestation	Application Rate in l/ha	Water Volume	Application Details
Grassland destruction and control of associated weeds	Short rotation rye grass with annual weeds	Application rates should be adapted to control the least susceptible weeds present. See the following table for dose rates.	2.25	Hydraulic sprayers 150-250 l/ha	Treat re-growth after grazing or mowing or before grazing or cutting between June and October when grass is 30-60 cms high and does not contain mature seeds. Grass may be used for normal uses 5 days after treatment. REMOVE OR BURY ALL POISONOUS PLANTS BEFORE MOWING OR GRAZING. Treat following re-growth or after grazing or mowing. Clear treated grass crop before planting or drilling the next crop. Grass and clover may be direct drilled after treatment of 1-2 year leys without mat, with all surface vegetation removed before drilling, 14 days after spraying. Long leys with some mat should be sprayed in the autumn and not direct drilled until the following spring.
	Perennial grasses in leys of 2-4 years		3.0		
	Perennial broad-leaved weeds in long leys of 4-7 years		3.0		
	Permanent pasture		4.5		

DOSE RATES FOR CONTROLLING WEED SPECIES IN GRASSLANDS

Application Rate-2.25 l/ha		
Annual Meadow-grass	Italian Rye-grass	
Common chickweed	Dock seedlings	Common Mouse-ear
Speedwell spp.	Mayweed spp	
Application Rate-3.0 l/ha		
Black Bent-grass	Common Bent-grass	Broad-leaved Dock
Creeping Softgrass	Plantains	Scutch (couch) grass
Curled dock	Yorkshire fog	Cock's-foot
Creeping Bent-grass	Soft Brome	Perennial Rye-grass
Rough Meadow-grass		
Application Rate-3.75 l/ha		
Yarrow	Creeping Thistle	Perennial Sow-thistle
Common Nettle	Daisy	Spear Thistle
Bracken **	Sedges	Dwarf Thistle
Tufted Hair-grass	Soft rush	Creeping buttercup*
Application Rate-4.5 l/ha		
Common Ragwort	Jointed Rush	Red Fescue
Hard Rush	Purple Moor-grass	Sheep's Fescue
Heath Rush	White Clover*	Sheeps Sorrel

*Must be treated at the correct growth stage.

**Must be treated when the fronds are fully expanded

NON-CROP AREAS

Kernel should be applied at a maximum rate of 4.5 l/ha on land not intended for cropping.

Area of Use	Target Weeds	Extent of Weed Infestation	Application Rate in l/ha	Water Volume	Application Details
Non-crop areas	Annual weeds	All species	1.125	Hydraulic sprayers 80-250 l/ha	DO NOT USE IN OR ALONG HEDGEROWS. DO NOT USE UNDER GLASS OR POLYTHENE. For use for weed control; - along fences, around buildings and storage areas, along roads, paths and ditch edges. - for clearance of land prior to sowing; - To control re-growth in root crop storage areas.
	Perennial grasses	All species	3.0		
	Perennial broadleaved weeds	All species	4.5		

* Droplet size should be within 200-300 microns

SET-ASIDE LAND

Area of Use	Target Weeds	Extent of Weed Infestation	Application Rate in l/ha	Water Volume	Application Details
Set-aside Management	Annual weeds including Volunteer and Wild-oats, Black-grass, Brome	Germinating seedlings	0.75-1.125	Hydraulic sprayers 80-250 l/ha or Knapsack sprayer	Treat Wild-oats from June-Aug., Blackgrass from May-June, Brome from May-June. Repeat treatment to control re-emergent weeds. Termination — treat mid-May and re-emergent weeds after mid-June.
Set-aside Termination	Various perennial grasses.	<75 shoots/m ²	2.25		
		>75 shoots/m ²	3.0		
	Annual and perennial broad-leaved weeds	All species at all levels	3.0		

ORCHARDS

Area of Use	Target Weeds	Extent of Weed Infestation	Application Rate in l/ha	Water Volume	Application Details
Top fruit orchards	Perennial grasses and broadleaved weeds in; - arable stubbles - pastures	All species at all levels	3.0 3.75	Hydraulic sprayers 200-250 l/ha or rotary atomisers 40 l/ha*.	Allow 7 days after spraying before planting top fruit crops.
Within orchards containing apples, pears, plums, cherries and damsons	Perennial grasses and broadleaved weeds	All species at all levels	3.75	Hydraulic sprayers 200-400 l/ha optimum 250 l/ha.	Fruit trees should be established for at least two years before treatment. AVOID CONTACT WITH BRANCHES AND TRUNKS 30 CM ABOVE GROUND LEVEL. Treat after trees have lost their leaves in autumn or for apples and pears in spring before green cluster and before white bud stage for stone fruit.

*Droplet size should be within 200-300 microns.

AQUATIC USE

GLYFOS may be used against aquatic weeds in and along waterways and irrigation ditches at a maximum rate of 6 l/ha.

Area of Use	Target Weeds	Extent of Weed Infestation	Application Rate in l/ha	Water Volume	Application Details
Aquatic emergent weeds	Soft rush, Reed canary grass, Bulrush, Reed sweet-grass, Sedges, Watercress, Whorl-grass, Creeping Bent Common Reed	All species at all levels	3.75 4.5	Hydraulic sprayers 200-400 l/ha (Optimum 250 l/ha)	ONLY APPLY TO EMERGED WEEDS. DO NOT APPLY TO OPEN WATER. Apply using tractor or boat mounted sprayer. Apply AGAINST the direction of flow if waterway is flowing. The speed of 8 km/h should not be exceeded for tractor mounted sprayers. With boat mounted sprayers use the slowest forward speed possible.

Do not dump surplus herbicide in water or ditch bottoms. Maximum permitted concentration in water 0.2 ppm.

FORESTRY

When conventional hydraulic sprayers are being used the performance of KERNEL can be improved by the addition of a suitable adjuvant, (e.g. High Trees Mixture B, PCS No. 91597) for all pre-plant and post plant uses in forestry only.

Adjuvants should not be added when using rotary atomiser sprayers.

KERNEL should be applied post planting in forestry at a maximum rate of 7.5 l/ha. The following tables show the application rates against common weeds found in forestry. These rates will not necessarily be sufficient to control these weeds under other agricultural conditions:

Uplands: 1.5 litres/ha
Lowlands: 1.125 litres/ha

Black Bent-grass	Creeping Soft-grass	Cock's-foot	Scutch (Couch)	False Oat-grass	Fescue spp
Meadow-grass	Other bent spp	Purple Moor-grass	Sweet Vernal-grass	Tufted Hair-grass	Wavy Hair-grass
Yorkshire Fog	Bush-grass				

Area of Use	Target Weeds	Extent of Weed Infestation	Application Rate in l/ha	Water Volume	Application Details
Forestry					
Pre-planting	Arable land, planting, re-planting and grassland areas	Arable weeds Grassland weeds	3.0 3.75	Hydraulic sprayers 200-400 l/ha optimum 250 l/ha or Rotary atomisers 40 l/ha*	All tree species may be planted 7 days after treatment.

Area of Use	Target Weeds	Extent of Weed Infestation	Application Rate in l/ha	Water Volume	Application Details
Post-planting Clean-up around trees (Kernel gives moderate control of woody weeds)	Perennial and annual grasses	All species at all levels	3.0	Hydraulic knap-sack sprayers. Apply at a concentration of 2% or 1 part of Kernel to 50 parts of water (equivalent to 4 l/ha) See Spray Application Techniques and Equipment	Always use TREE GUARD when treating the growing season. Bracken should be treated after frond tips are uncurled but pre-senescence. Apply to heather late August to end of September. Apply to all other woody weeds from June to August before leaf senescence (but after new crop growth has hardened). Bracken should be treated after frond tips are uncurled but pre-senescence. (+) use adjuvant Mixture B for optimum results.
	Bracken, Beech-brush, Brambles, Ash, Oak, Willow, Sycamore, Hazel,		2.25		
	Heather - peat soil - mineral soil		3.75 4.5		
	Rhododendron		7.5 or 6.0(+)		
Overall spraying post planting in dormant season	Grass weeds in lowland and upland areas	See previous table	1.125 - 1.5	Hydraulic sprayers 200-250 l/ha or hand held equipment (See Spray Application Techniques and Equipment)	DO NOT OVERALL SPRAY trees grown for ornamental purposes including Christmas trees. When fully dormant and the leader growth has hardened it is safe to over-spray the following species; Corsican, Lodgepole and Scots Pines, Norway and Sitka Spruce, Lawson Cypress, Western Red Cedar. Douglas and Nobel Firs may be sprayed when fully dormant and when leader growth has hardened, but NOT in spring. It is a good idea to test crop safely by spraying a small area before conducting widespread overall treatment in following years.
	Brackens		1.125		
	Beech, Birch Brambles		1.125 - 2.25		

* Droplet size should be within 200-300 microns

SPRAY APPLICATION TECHNIQUES AND EQUIPMENT

1. Hydraulic sprayers mounted on tractors

Use any equipment which can apply at 80-250 litres/ha as a Medium or Coarse spray (as defined by BCPC) with a pressure of 1.5-2.5 bar and 80° or 110° nozzles.

Pre-harvest applications should be made using high clearance tractors with narrow wheels and crop dividers, where the spray boom can be raised to just above the top of the crop.

For most applications, 200-250 litres of water/ha should be used. Spray pressure (typically 1.5-2.5 bar) should be adjusted and related to tractor speed, water volume and nozzle type. However, specific low-volume nozzles may be used with a reduced water volume of 80-120 litres.

When using low volumes, spray pressure and tractor speed should be adjusted. A typical speed range would be 4-9 km/hour. When applying pre-harvest to crops, a low speed to avoid boom bounce is recommended.

All spray equipment should be calibrated before use, particularly if nozzles have been changed.

Check at least one nozzle from each side of the boom. Before starting spraying, check that the boom is level, the boom height is correct for the intended application, and all the nozzles on the boom are aligned at the correct angle to the forward direction of the tractor.

Filling Spray Tank

Half fill clean spray tank with clean water, add required quantity of product and mix well: add remaining water. Do NOT use mechanical agitators. Place the filling hose below water level to prevent excessive foaming and remove immediately after filling to prevent back-siphoning.

When tank-mixing with other products recommended on the label add the other product before adding KERNEL, then add the remaining water.

Sprayer Maintenance

Be sure that all spraying equipment is functioning correctly and is maintained in accordance with the manufacturers instructions. Ensure that any damaged malfunctioning or worn parts are replaced before using the spraying equipment.

Cleaning sprayers

Always clean spray tanks and equipment adequately after use, using the recommended detergents to avoid contamination with residues. Contamination with product residues could damage crops when the sprayer is next used for another pesticide.

2. Non-selective applications (Rotary Atomisers)

Overall mist-blower and ULVA applications are only to be used in forestry or in orchards.

When using ULVA the total spray volume should range from 10-20 litres/ha and with mist-blower between 90-175 litres/ha. Use the correct dose rate of Kernel for control of the particular target weed.

Recommended applicators include CDA Boom and CDA Lightweight, Microdrop, Girojet, Dual-Option sprayer, Hydraspin.

3. Directed Application with a Knapsack Sprayer

Knapsack sprayers may be used in forestry, orchards and non-crop land. Spray volumes normally range from 200-300 litres/ha but may be reduced to 100-150 litres/ha if low volume nozzles have been fitted. Spray quality should be 'Medium' or 'Coarse'.

An application rate of 3 litres/ha and a water volume of 200 litres/ha represents a 1.5% concentration of Kernel. A knapsack sprayer with a total capacity of 10 litres thus requires 150 ml of Kernel and 9.85 litres of water. Similarly if the application rate is 4.5 litres/ha, the dilution is 225 ml of Kernel in 9.775 litres of water.

A 10-litre sprayer will cover an area of 500 sq. metres at a 1 metre/second walking pace and a 1-metre wide spray swath.

Weedwiper Applications

For use in orchards, forestry, non-crop land and aquatic areas — apply a solution containing 25% Kernel in water (1 part Kernel to 3 parts of water) or a 37.5% solution under hot dry conditions.