agrovista
amenity

Controls

Controls guide for managed amenity turf including PGRs, fungicides, herbicides and wetting agents

Welcome

Managing good quality turf surfaces and other amenity areas presents many challenges. Our objective is to maintain healthy plants whilst minimising the presence of undesirable fungal, insect and plant pests. To add to the challenge, we live in a time of increasing legislative and environmental change which can have significant impacts on the outcomes of our choices. With this in mind, the importance of making informed decisions is clear. They are the foundation of our management plans and enable us to continue delivering high quality amenity environments.

By providing a better understanding of the principles behind an integrated approach to pest management as well as knowledge about the products that can be used to facilitate this, we hope that this brochure will help you to make informed decisions which will result in positive outcomes.

To support your decisions, your Agrovista Amenity representative is qualified to BASIS and FACTS as a minimum and can offer additional support in product selection and advice which is specific to the environment you manage. To further supplement your knowledge, our free to use Agrovista Amenity Academy (www.amenityacademy.co.uk) contains a variety of courses covering product knowledge as well as wider aspects of managing amenity environments. The courses have been designed to help you to increase your knowledge and to get the maximum benefit from the products you use whilst enabling you to earn CPD points.

We hope that you find our controls brochure informative and useful. Please contact your local Agrovista Amenity representative if you require further information.

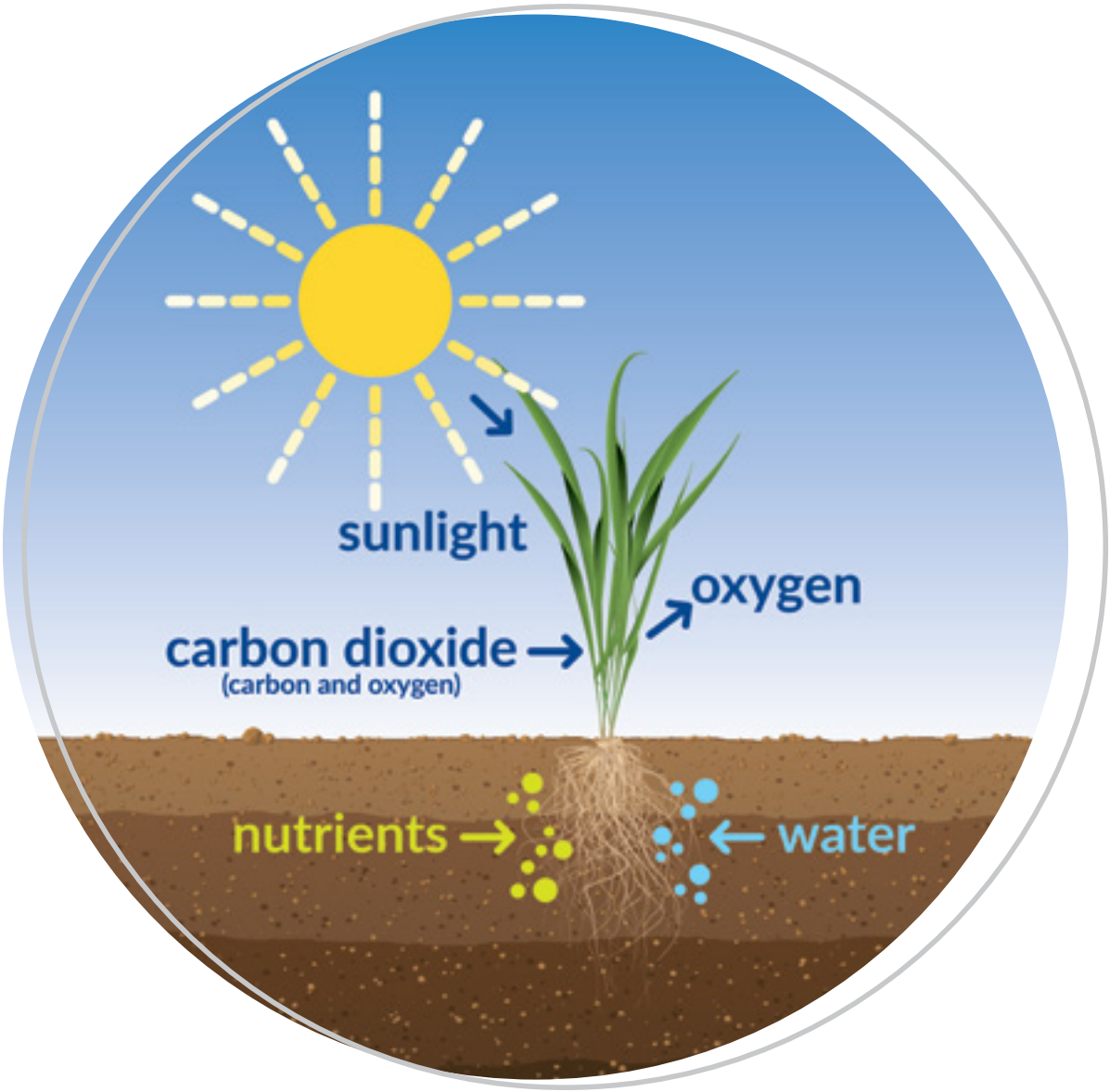
Dr Abigail Graceson
Technical Manager – Agrovista Amenity

Product index

Technical index

Plant growth regulators

To enable growth, all plants require light, water, air, nutrients, and the right temperature. If given these things and sufficient space in which to grow, plants are able to create food through photosynthesis and breakdown that food for energy through respiration. Plant growth will be restricted by the absence or reduction of any one of these factors, even if other factors are increased.



Phytohormones enable plants to organise their activity according to these external stimuli to create the right growth response at the right time.

Gibberellin is the main phytohormone responsible for stem elongation. By targeting the production of gibberellin using plant growth regulators (PGRs) turf managers are able to restrict growth whilst maintaining environmental conditions that lead to good plant health.

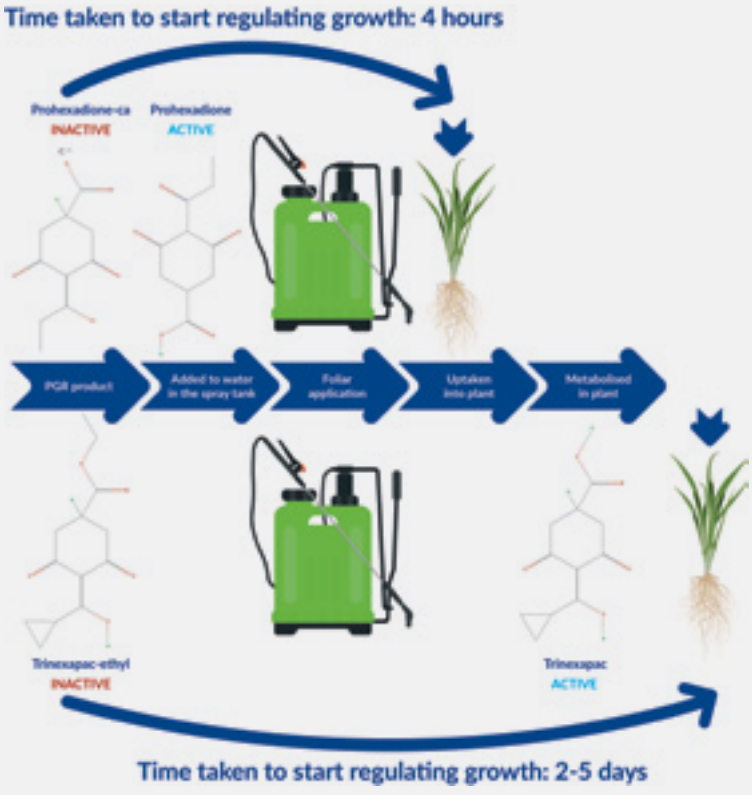
Both prohexadione-calcium and trinexapac-ethyl inhibit the biosynthesis of gibberellins resulting in shortened internode distances and reduced shoot growth. Furthermore, because the plant is no longer actively growing upwards it can increase its lateral growth resulting in increased sward density and a bigger rooting system with more fine roots. This change in plant structure is associated with better plant health and stress resilience due to an increase in ability to uptake water and nutrients.

Plant growth regulators

Attraxor®

Attraxor® provides effective growth regulation of all species of turf grass, making it suitable for improving playing surface quality and reducing workloads through lowering clipping yields. Attraxor® can be used on all managed amenity turf surfaces from sports surfaces such as golf and bowling greens, fairways, and tees, tennis courts, and sports pitches to garden and ornamental lawns. It can also be used on amenity grassland which includes areas such as golf roughs, railway embankments and roadside verges as well as parkland.

Attraxor® works by inhibiting the gibberellic acid pathway leading to a reduction in turf height and in clipping yield. The active substance, prohexadione-calcium is activated as soon as it comes into contact with water. This means that activation happens in the spray tank and therefore growth regulation occurs rapidly following the application of the product.



Because the activity of prohexadione-ca is not reliant on particular metabolic processes within the grass plant it can be applied earlier in the season than other plant growth regulators. This can help to improve the uniformity, visual quality, and playing quality of playing surfaces by regulating the development of problem species such as Poa annua at a time when they are developing seedheads.

Due to the restriction in upwards growth, the grass plant is able to divert its energies into other activities. In particular, use of Attraxor® is associated with the development of bigger rooting systems with a greater number of fine roots leading to improved stress resilience and better plant health through increased uptake of water and nutrients. Attraxor® is also known to assist in the development of a denser turf sward.

Attraxor® contains a water conditioner to assist in the development of spray tank conditions and its rapid activation. This occurs most effectively in a tank solution below pH 5 and in soft to moderately hard water. In some circumstances it can be useful to acidify the tank using ammonium sulphate or a buffer solution to assist the formulation water conditioner in reducing the solution pH and minimising the effects from hard water.

Key benefits:

- Regulates growth of all grass species evenly
- Improves playing surface quality and turf appearance
- Reduces clipping yields
- Improves root development leading to healthier grass
- Rapid growth regulation even at lower temperatures

Active substances	100g/kg prohexadione-calcium
Additional ingredients	Ammonium bisulphate water conditioner
Application rate	0.3-1.5kg/ha
Water volume	300-600l/ha
Pack size	1.5kg
Pack coverage	5-1ha
Application timing	When air temperatures are >7°C and grass is actively growing. The Agrovista Amenity Attraxor® dial shows when conditions are suitable in your area.
Maximum annual dose	6kg/ha
Application interval	At least 21 days
Crops	Amenity grassland, Managed amenity turf
Application equipment	Vehicle mounted boom sprayer, Knapsack sprayer

Primo Maxx® II

Primo Maxx® II can be used to help reduce turf management workload and improve turf quality by limiting cell elongation and vertical growth of turf grasses. Primo Maxx® II contains the active substance, trinexapac-ethyl which blocks the production of gibberellic acid within the leaf leading to a more compact growth form.

Trinexapac-ethyl is activated by metabolic processes in the plant and is therefore most effective when soil temperatures are consistently >10°C. Activation within the plant occurs around 3-5 days after application and lasts for up to six weeks. Whilst Primo Maxx® II is actively regulating plant growth, turf managers can expect a reduction in clipping yields and an improvement in playing surface quality. Use of Primo Maxx® II is also associated with greater rooting, and drought and shade tolerance.

Key benefits:

- Reduces clipping yields
- Creates a more compact grass growth form
- Increases rooting, and drought and shade tolerance
- Improves playing surface quality

Active substances	116.4g/l trinexapac-ethyl	
Application rate	0.4-3.2l/ha	
Water volume	300-1000l/ha	
Pack size	5l	10l
Pack coverage	12-2ha	25-3ha
Application timing	When soil temperatures are consistently >10°C	
Maximum annual dose	16l/ha	
Application interval	At least 7 days	
Crops	Amenity grassland, Managed amenity turf	
Application equipment	Vehicle mounted boom sprayer, Knapsack sprayer	

Fungicide mode of action

When using fungicides as part of an integrated approach to the control of fungal pathogens on turfgrass it is important to time applications to achieve maximum effectiveness and to rotate active substances to minimise the likelihood of resistance developing.

For managed amenity turf there are:

9 ***active substances*** *belonging to..* ***4*** ***groups*** *assigned to..* ***3*** ***modes of action***

Mode of action	Mode of action description	FRAC group*	Active substance
Sterol Biosynthesis in Membranes	Prevents fungal growth by inhibiting the production of sterols for cell wall formation	3 DMI	Tebuconazole Difenoconazole Mefentrifluconazole
Respiration	Prevents spore germination by inhibiting energy production in fungal cells	7 SDHI	Benzovindiflupyr Fluopyram
		11 QoI	Azoxystrobin Trifloxystrobin Pyraclostrobin
Signal transduction	Prevents mycelial growth by inhibiting the ability of the fungal pathogen to accumulate sugars	12 PP	Fludioxonil

* To reduce the likelihood of resistance to active substances always rotate between fungicides which are in different Fungicide Resistance Action Committee (FRAC) groups.

Fungicides

Medallion® TL

The active substance in Medallion® TL (fludioxonil) works on the leaf surface, in the thatch, and on the soil surface. It provides excellent long-lasting protection, preventing the establishment of susceptible pathogens. Medallion® TL is a local penetrant with movement of the active substance occurring across the leaf blade. It binds tightly to the waxes on the leaf surface and is therefore highly resistant to wash-off by rainfall, improving its ability to provide a protective shield which prevents infection.

Medallion® TL also reduces infections by targeting disease spores. This can help to decrease disease pressure by reducing initial infections, improving turf appearance and health.

Key benefits:

- Long lasting preventative action
- Targets disease spores to reduce infection
- Active against pathogens on the leaf, in the thatch and on the soil surface

Active substances	125g/l fludioxonil	
Application rate	3l/ha	
Water volume	125-500l/ha	
Pack size	1l	3l
Pack coverage	0.3ha	1ha
Crops	Amenity grassland, Managed amenity turf	
Applications per year	4	
Application equipment	Vehicle mounted boom sprayer, Knapsack sprayer	
Diseases targeted	Microdochium patch, Leaf spot, Anthracnose	
Mode of Action	Signal transduction	
FRAC group	12	
Application category	Protective: Contact & local penetrant	

Instrata® Elite

Instrata® Elite contains two active substances with two different modes of action to help tackle turf diseases more effectively. Difenoconazole works systemically whilst fludioxonil has a translaminar movement across the leaf surface, providing both a protective and curative effect.

Instrata® Elite has been formulated for rapid uptake into the plant and is safely locked on the leaf wax within 30 minutes following application, ensuring reliable results that are unaffected by rain or irrigation wash off. The formulation targets spores in the thatch and on the soil surface as well as on the leaf.

Key benefits:

- Contains 2 active substances to target disease more effectively
- Rapid curative activity
- Rainfast rapidly following application

Active substances	80.3g/l Difenoconazole, 80.3g/l Fludioxonil	
Application rate	3l/ha	
Water volume	125-500l/ha	
Pack size	1l	3l
Pack coverage	0.3ha	1ha
Crops	Managed amenity turf	
Applications per year	2	
Application equipment	Vehicle mounted boom sprayer, Knapsack sprayer	
Diseases targeted	Microdochium patch, Dollar spot, Brown patch, Anthracnose (moderate control), Red thread (moderate control)	
	Difenoconazole	**Fludioxonil**
Mode of Action	Sterol biosynthesis in membranes	Signal transduction
FRAC group	3	12
Application category	Curative: Acropetal penetrant	Protective: Contact & local penetrant

Heritage®

Heritage® is a broad-spectrum fungicide which can be used to tackle a range of key turf diseases. The active substance, azoxystrobin, works by blocking the pathogens' ability to produce energy. Heritage® is a systemic fungicide with acropetal (upwards) movement through the plant. This means that it is most effective when used preventatively when conditions are suitable for disease development, but symptoms have not yet been observed.

Heritage® can be absorbed through the roots, crown, shoots, and leaves where and is then evenly distributed and actively recycled through the plant. Heritage® gives long lasting protection against turf diseases.

Key benefits:

- Targets a wide range of key turf diseases
- Provides long lasting protection
- Absorbed through all parts of the turf plant

Active substances	500g/kg azoxystrobin	
Application rate	0.5kg/ha	
Water volume	125-1000l/ha	
Pack size	100g	500g
Pack coverage	0.2ha	1ha
Crops	Managed amenity turf	
Applications per year	4	
Application equipment	Vehicle mounted boom sprayer, Knapsack sprayer	
Diseases targeted	Anthracnose, Brown patch, Fairy rings (type 2), Melting out, Microdochium, Rust, Take-all patch	
Mode of Action	Respiration	
FRAC group	11	
Application category	Protective: local penetrant & Curative: acropetal penetrant	

A broad-spectrum fungicide which can be used to tackle a range of key turf diseases.

Insignia®

Insignia® is a local penetrant fungicide containing the active substance, pyraclostrobin. Insignia® provides an effective protective action against a range of turf diseases. Its translaminar movement across the leaf blade means that the leaf is protected on both surfaces and inside the leaf. Pyraclostrobin targets more stages of a fungal pathogen's life cycle than other strobilurin fungicides such as azoxystrobin. It provides effective protection against spore germination and penetration, mycelium growth and against sporulation.

Insignia® is rainfast within 1 hour of application and works consistently even at cooler temperatures. In addition to its fungicidal activity, the Intrinsic® effect from Insignia® applications helps plants to resist disease attacks, withstand abiotic stresses and to grow more effectively.

Key benefits:

- Protective action against a range of turf diseases
- Active against multiple life stages of the pathogen
- Rainfast within 1 hour
- Provides additional plant health benefits

Active substances	200g/l pyraclostrobin
Application rate	1.25kg/ha
Water volume	200l/ha (minimum)
Pack size	250g
Pack coverage	0.2ha
Crops	Managed amenity turf
Applications per year	2
Application equipment	Vehicle mounted sprayer, Knapsack sprayer
Diseases targeted	Red thread, Microdochium patch, Dollar spot
Mode of Action	Respiration
FRAC group	11
Application category	Protective: local penetrant

Ascernity®

Ascernity® contains two active substances with different modes of action for improved activity against turf diseases. It can be used against a range of key turf diseases including microdochium patch, anthracnose, and dollar spot. Ascernity® works by preventing the pathogen from absorbing sugars from the plant which rapidly stops its growth and halts the spread of disease. Ascernity® is best applied prior to the onset of disease symptoms but has both preventative and curative activity.

Ascernity® creates a protective coating on the leaf surface and moves evenly through the plant to counter disease that is already active within the leaf. The balance of translaminar and systemic movement through the plant helps to improve longevity with studies demonstrating good distribution in the leaf even after 14 days.

Key benefits:

- Contains two active substances
- Preventative and curative activity
- Excellent longevity

Active substances	23.6g/l benzovindiflupyr (Solatenol) 78.9g/l difenoconazole	
Application rate	3l/ha	
Water volume	125-500l/ha	
Pack size	3l	
Pack coverage	1ha	
Crops	Managed amenity turf	
Applications per year	2	
Application equipment	Vehicle mounted sprayer Knapsack sprayer	
Diseases targeted	Microdochium patch Dollar spot Anthracnose	
	Benzovindiflupyr	**Difenoconazole**
Mode of Action	Respiration	Sterol Biosynthesis in membranes
FRAC group	7	3
Application category	Protective: local penetrant	Curative: acropetal penetrant

Maxtima®

Maxtima® provides turf-safe broad-spectrum disease control powered by an innovative new active ingredient, mefentrifluconazole. Mefentrifluconazole is a demethylase inhibiting fungicide which delivers exceptional performance due to its ability to bind more powerfully to the target site, resulting in long-lasting performance and an improved activity against a wide range of pathogens.

Mefentrifluconazole is rapidly uptaken into the plant and quickly gets to work stopping active infections. The active ingredient remains inside the leaf tissue after uptake and is slowly released from this reservoir to provide long-lasting protection of up to 28 days.

In addition to its superior performance against many common turf fungal pathogens, Maxtima® has a favourable environmental profile with low application rates and low toxicity to non-target organisms. Its unique chemistry means that it is an excellent rotation partner for non-DMI fungicides on sports pitches, greens, fairways and tees.

Key benefits:

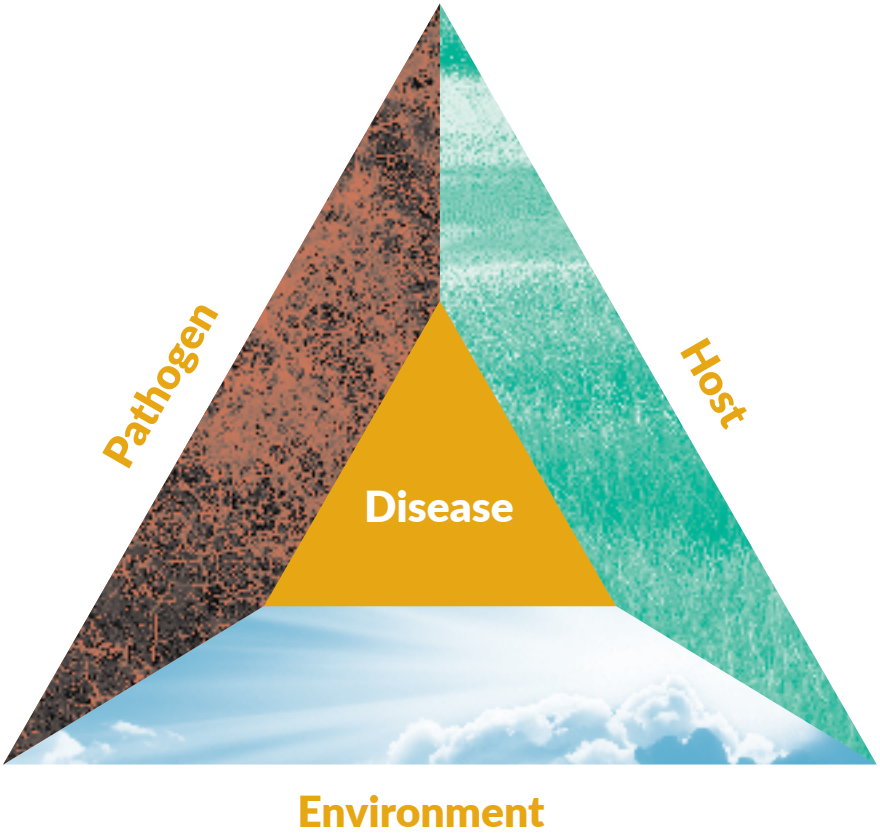
- Controls the toughest turf diseases
- Exceptional turfgrass safety
- Low application rates
- Long-lasting protection

Active substances	100g/l mefentrifluconazole
Application rate	1.5l/ha
Water volume	300-600l/ha
Pack size	1l
Pack coverage	0.6 ha
Crops	Managed amenity turf
Applications per year	2
Application equipment	Vehicle mounted sprayer Knapsack sprayer
Diseases targeted	Microdochium patch Dollar spot
Mode of Action	Sterol biosynthesis in membranes
FRAC group	3
Application category	Curative: acropetal penetrant

Understanding fungicides

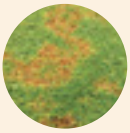
Turf diseases

Turf surfaces can be susceptible to a variety of fungal pathogens because they are highly managed environments which can undergo considerable stresses. The disease triangle illustrates that disease is the result of three interacting factors: the pathogen, the host, and the environment.



Pathogens may be present but without a suitable host or environmental conditions they will not develop to create disease within the plant. An integrated approach to turfgrass management can be used to reduce the risk of diseases developing. This can include actions to remove the host by using species or cultivars that are not susceptible to particular diseases. The environment can also be manipulated, for example by ensuring that the turf has appropriate amounts of air circulation, water, and nutrition to encourage healthy growth.

When turf diseases do develop, or when the environmental conditions mean that they are likely to develop, conventional fungicides remain an important part of an integrated approach to disease management on turf surfaces. An understanding of the risk periods for different fungal pathogens and of the environmental conditions that favour them can help turf managers to anticipate when treatment might be required.

Disease	Image	Symptoms	Triggers	Risk period
Microdochium patch *Microdochium nivale*		Orange-brown patches 2.5-5cm across with creamy white mycelium visible in the early morning.	• Temperature <15°C • Poor drainage • Surface humidity • Excess foliar growth • Heavy traffic • Low K	J F M A M J J A S O N D

Anthracnose *Colletotrichum cereale*		Foliar blight is characterised by yellow or reddish lesions on leaves and a water-soaked appearance.
		
		Basal rot is characterised by dark brown to black appearance at the base of the plant with the leaf sheaths above appearing orange to yellow.
			• Poor growing conditions including:
			  • Poor fertility
			  • Close mowing
			  • Compaction
			  • Heat
			  • Drought
				J F M A M J J A S O N D

Dollar spot *Sclerotinia homoeocarpa*		Straw coloured, bleached spots typically 10-20mm in diameter. Diseased grass is usually dry and a dark margin can be seen separating the dead straw-coloured tissue from the green parts of the leaf blade.	• Extended period of leaf wetness • Drought stress • Deficient N • Excessive thatch • Low mowing heights	J F M A M J J A S O N D
Red thread *Laetisaria fuciformis*		Small patches of dead leaves interspersed with live plants with a pale pink colouring.	• Temperatures around 21°C • Prolonged leaf wetness • Slow growing turf	J F M A M J J A S O N D
Leaf spot and melting out *Bipolaris spp. and Drechslera spp.*		Unsightly oval spots on leaf blades which develop dark purpleish-red or brown oval borders around tan centres as the disease progresses.	• Surface humidity • Drought stress • Deficient or excess N • Excess thatch • Low mowing heights	J F M A M J J A S O N D
Take-all patch *Gauemannomyces graminis*		Rings or partial rings of orange/brown turf from 10cm to 1m in diameter. Turf inside the ring is thinned.	• Swards with dominant bent grass • Wet weather • Poor drainage • Excess N • Close mowing	J F M A M J J A S O N D

Fungicide application timing

Currently authorised fungicides all reduce disease most effectively when they are applied either before disease development or in the very early stages of disease development. They can be split into two categories:

Protective fungicides

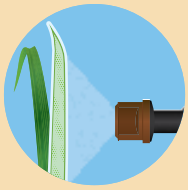
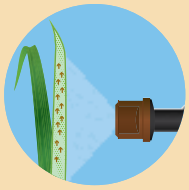
Protective fungicides need to be applied before or during spore germination to prevent the penetration of fungal hyphae into plant tissues **before** the pathogen becomes established.

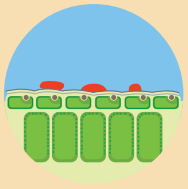
Contact fungicides are not absorbed into the plant, whilst **local penetrants** are held on, or within, the waxy outer surface of the leaf. They may translocate to the other surface of the leaf but will not move systemically around the plant.

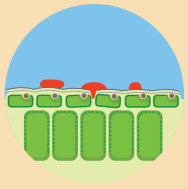
Curative fungicides

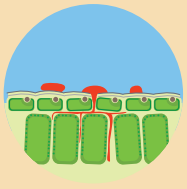
Curative fungicides can be applied at the early stages of active infection and will move through the plant to control the development of fungal hyphae.

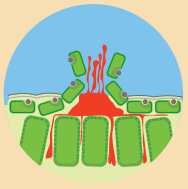
Local penetrants may have some curative ability directly below the site of application as the active substance moves from one leaf surface to the other. However, **acropetal penetrants** will be translocated upwards through the plant in the xylem. This means that they can reach plant tissues that have not been sprayed.

Contact	Local penetrant	Acropetal penetrant
 Contact	 Local penetrant	 Acropetal penetrant
Fludioxonil		
	Benzovindiflupyr	
	Pyraclostrobin	
	Trifloxystrobin	
	Fluopyram	
	Azoxystrobin	
		Difenoconazole
		Mefentriconazole
		Tebuconazole


Spore germination


Penetration


Mycelial growth


Blistering


Sporulation

Protectant | Curative | Eradicant*

Fungicides all reduce disease most effectively when they are applied either before disease development or in the very early stages.

* Protectant and curative fungicides cannot eradicate existing established infections but can provide useful protection to prevent the spread of disease if conditions remain favourable for its development.

Turf health packages

When environmental conditions are conducive to the development of plant diseases it is particularly important to take action to reduce the likelihood of turf surfaces becoming infected. The best defence against plant diseases is a well-considered offence that helps to:

- Improve plant health
- Build resilience against biotic stresses
- Create an uninviting environment for pathogen establishment
- Repel infections

With this in mind, we have developed a range of turf health packages which will help you to improve turf quality and reduce the onset of diseases. Each of our turf health packages contains a range of products which can be tank mixed together and which may include:

- Fungicides to target the disease
- Biostimulants to help build turf resilience to biotic stresses
- Nutrients to improve turf growth and recovery

For more information and to help you to choose the right turf health package for your situation please contact your local amenity specialist.

Creating selective herbicides

Manufacturers of selective herbicides will often combine active substances to develop products with particular characteristics that can effectively control a range of weeds in a given crop. In managed amenity turf and amenity grassland we have a range of products that are designed to tackle weeds with different growth habits.

Products containing active substances with different modes of action may extend the range of weeds that are controlled and can also help to combat resistance by increasing the proportion of weeds that are controlled.

....01

Annual weeds
e.g. chickweed, speedwell, hairy bittercress etc

....02

Perennial weeds with deep tap roots
e.g. dandelion, dock, spear thistle etc

....03

Perennial weeds with creeping roots and stems
e.g. clover, buttercup, creeping thistle etc

....04

Perennial weeds with difficult to penetrate leaves
e.g. daisy, plantain etc

....05

Woody weeds
e.g. Brambles, Japanese knotweed, willowherb etc

Selective herbicides

T2 Green Pro

A selective herbicide for the control of a wide range of annual and broadleaved weeds in managed amenity turf and amenity grassland, T2 Green Pro contains three active substances to aid activity against difficult to control perennial weeds.

Active substances	43.3g/l mecoprop-p + 245g/l MCPA + 19.5g/l dicamba
Application rate	5l/ha
Water volume	170-400l/ha
Pack size	10l
Pack coverage	2ha
Application timing	When grass is actively growing (generally April-September)
Applications per year	1
Crops	Amenity grassland Managed amenity turf
Application equipment	Vehicle mounted boom sprayer

Duplosan® KV

A selective herbicide containing an optically active form of mecoprop-p which is effective in cooler temperatures and at low application rates. Duplosan® KV controls a wide range of annual and broadleaved weeds in managed amenity turf, amenity grassland and grass seed crops.

Active substances	600g/l Mecoprop-P
Application rate	1.5-2.4l/ha
Water volume	185-400l/ha
Pack size	10l
Pack coverage	6.6-4.2ha
Application timing	When crop is actively growing (generally April-September)
Applications per year	2 (1 on seed crops)
Crops	Amenity grassland Grassland (seed crops) Managed amenity turf
Application equipment	Vehicle mounted boom sprayer Knapsack sprayer

Depitox® 500

A selective herbicide which effectively controls a wide range of common annual and broadleaved weeds. Depitox® 500 has good compatibility with other products and is ideal for tank mixing. Depitox® 500 can be applied to managed amenity turf, amenity grassland and grassland.

Active substances	500g/l 2,4-D
Application rate	2.8-3.3l/ha
Water volume	100-1000l/ha
Pack size	5l
Pack coverage	1.8-1.5ha
Application timing	When crop is actively growing (generally April-September)
Applications per year	1
Crops	Amenity grassland Grassland Managed amenity turf
Application equipment	Vehicle mounted boom sprayer Knapsack sprayer

Mixing selective herbicides

It is possible to further extend the range of weeds that are controlled by one application by mixing together herbicides containing different active substances. Known as tank-mixing, this can help to:

- Increase the number of weed species that are controlled
- Reduce the number of spray operations that are required

Before mixing two or more plant protection products it is important to check:

- The products are compatible
- The use of the mix will be within the conditions specified on each label
- There is not a specific label restriction for that particular mix

Always follow the recommendations in the Code of Practice for Using Plant Protection Products and if it is not a recommended mix always use a jar test before tank mixing. A jar test enables you to check for physical compatibility, such as separation, precipitation, or residues, before mixing larger volumes of product.

Three-way tank mix example

step 01

Fill the spray tank with half of the required 400-500l/ha water

step 02

Agitating the spray tank throughout, add the products in the following order :

1. T2 Green Pro @ 4l/ha
2. Duplosan @ 1.2l/ha
3. Depitox 500 @ 1.5l/ha

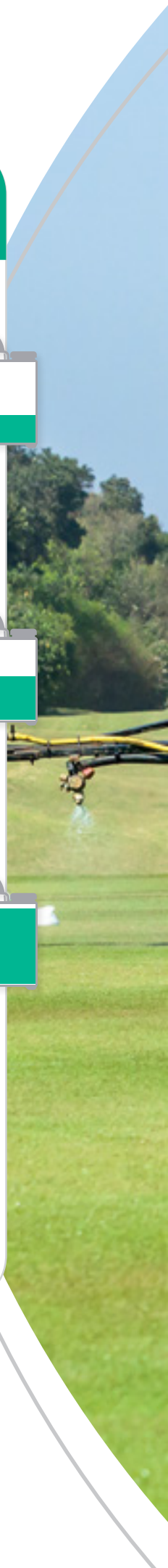
step 03

Continue agitating the spray tank and add the remaining water

step 04

Apply the tank mix

- Increase the spectrum of weeds controlled
- Complete the job with one application



Overtake®

The use of two active substances in different mode of action groups in Overtake® ensures reliable weed control in a wide range of temperatures and conditions and a reduced risk of weed resistance developing. Overtake® is most effectively used in the spring to control a wide range of weeds and improve early season turf growth and recovery. The use of Overtake® when turf weeds are small and susceptible results in improved turf surface quality.

Active substances	2.45g/l florasulam and 141.12g/l fluroxypyr
Application rate	2l/ha
Water volume	200-400l/ha
Pack size	5l
Pack coverage	2.5ha
Application timing	March-October for established grass or May to October for newly sown grass. Apply when weeds are actively growing and soil is moist
Applications per year	1
Crops	Amenity grassland, Managed amenity turf
Application equipment	Vehicle mounted boom sprayer Knapsack sprayer

Praxys®

Praxys® contains three active substances from different mode of action groups which are translocated throughout the plant following absorption through both the leaves and the roots. These attributes lead to the high level of target weed control that Praxys® provides. Praxys® is ideal for the management of common broadleaved weeds including dandelion, daisy, clover, buttercup, and ribwort plantain in both managed amenity turf and amenity grassland situations.

Active substances	80g/l clopyralid, 2.5g/l florasulam and 144g/l fluroxypyr-meptyl
Application rate	1-2l/ha
Water volume	100-400l/ha
Pack size	2l
Pack coverage	2-1ha
Application timing	1st February-30th September when weeds are actively growing and the soil is moist
Applications per year	1
Crops	Amenity grassland Managed amenity turf
Application equipment	Vehicle mounted boom sprayer Knapsack sprayer

Depitone Ultra®

Depitone Ultra® is an auxin mimic herbicide in the phenoxy-carboxylic acid group. It contains 2,4-D in the ethyl ester form which is more quickly absorbed into the leaf when air temperatures are cool compared with alternative forms of this active substance. Depitone Ultra® is most effective when applied to weeds that are actively growing as flower buds start to form. Its increased activity at cooler temperatures, makes Depitone Ultra® an ideal option for spring weed control applications on amenity grassland and managed amenity turf.

Active substances	600g/l 2,4-D
Application rate	2l/ha
Water volume	200-500l/ha
Pack size	5l
Pack coverage	2.5ha
Application timing	When crop and weeds are actively growing and flower buds are starting to form (generally March-September)
Applications per year	1
Crops	Amenity grassland, Grassland, Managed amenity turf
Application equipment	Vehicle mounted boom sprayer, Knapsack sprayer

Enforcer®

Due to the inclusion of four active substances in the formulation, Enforcer® provides excellent control of a wide range of weed species in managed amenity turf surfaces such as sports turf and lawns. Weeds that are particularly susceptible to Enforcer® include white clover, daisy, speedwell, and field forget-me-not. It can be applied at any point during the growing season (April-September) but is particularly effective when weed growth is favoured by warm temperatures and sunny conditions.

Active substances	70g/l 2,4-D, 20g/l dicamba, 70g/l MCPA and 42g/l mecoprop-p
Application rate	7.5l/ha
Water volume	1000l/ha
Pack size	5l
Pack coverage	0.7ha
Application timing	When weeds are actively growing (April-September)
Applications per year	1
Crops	Managed amenity turf
Application equipment	Vehicle mounted boom sprayer, Knapsack sprayer, Watering can

Celadon®

Celadon® is a versatile selective herbicide containing two active substances, florasulam and fluroxypyr. It can be used to control a wide range of broadleaved weeds on both established and newly sown turf surfaces. Celadon® is most effective when weeds are small and actively growing, controlling many problem weeds including daisy, dandelion, common mouse-ear, creeping buttercup, slender speedwell, and white clover.

Active substances	2.5g/l florasulam and 100g/l fluroxypyr
Application rate	2l/ha
Water volume	200l/ha
Pack size	2l
Pack coverage	1ha
Application timing	When weeds are actively growing and soil is moist (March-October)
Applications per year	1
Crops	Amenity grassland, Lawn, Managed amenity turf
Application equipment	Vehicle mounted boom sprayer, Knapsack sprayer

Icade®

The two active substances in Icade® work together to provide excellent control of difficult woody weeds. Icade® translocates throughout the plant, from root to tip, and is effective against many woody and invasive weeds including Japanese knotweed, giant hogweed, buddleia, and brambles. It is authorised for spot spraying so that problem weeds are effectively targeted.

Active substances	12g/l aminopyralid and 120g/l triclopyr
Application rate	150-200ml
Water volume	10l
Pack size	1l
Pack coverage	For spot treatments only
Application timing	Between 1st March-31st August when weeds are actively growing
Applications per year	Up to 1
Crops	Amenity grassland
Application equipment	Lance from a vehicle mounted sprayer Knapsack sprayer

Grazon® Pro

Grazon® Pro is a highly effective herbicide for control of broadleaved weeds including docks, thistles and nettles. Grazon® Pro contains clopyralid and triclopyr and can be used on amenity grassland such as golf roughs, airfields and roadside verges as well as grassland areas such as paddocks. Spot applications of Grazon® Pro allow for excellent targeting of problem weeds.

Active substances	60g/l clopyralid and 240 g/l triclopyr
Application rate	1.2l/ha
Water volume	200l/ha (60ml in 10l water)
Pack size	1l
Pack coverage	0.8ha
Application timing	1st March-31st October when weeds are actively growing
Applications per year	1
Crops	Amenity grassland, Grassland
Application equipment	Knapsack or other handheld sprayer

Understanding herbicides

Weed management in **managed amenity turf*** and **amenity grassland**** helps to improve the appearance and playing quality of turf surfaces through:

- Increased turf uniformity
- Better turf colour
- Improved turf density

It is important to use an integrated approach to weed management by considering cultural and biological methods in addition to the use of herbicides for managing weeds. Cultural and biological factors that can contribute to weed control and the presentation of high-quality turf surfaces include: grass species and cultivar selection, irrigation management, control of turf height and thatch, maintenance of soil structure and provision of suitable nutrition.

*__Managed amenity turf__ is frequently mown and intensively managed. It includes sports turf, golf greens, tees and fairways, bowling greens, tennis courts etc

**__Amenity grassland__ can be semi-natural or planted and receives minimal management. It includes roadside verges, golf roughs, parkland, airfields and railway embankments etc

In managed amenity turf and amenity grassland, there are authorisations for:

10 active substances

belonging to..

5 chemical families

assigned to..

2 mode of action groups

Herbicides remain an important part of an integrated approach to turfgrass management which assist with the control of all types of weeds when used appropriately. In managed amenity turf and amenity grassland, selective herbicides help to control broadleaved weeds without damaging the grasses.

The active substances contained in a selective herbicide will determine which type of weeds that herbicide is able to control. To ensure that selective herbicides continue to control all types of weeds effectively it is important to alternate active substances to reduce herbicide resistance risks.

> ***The active substances contained in a selective herbicide will determine which type of weeds that herbicide is able to control.***

Herbicide mode of action groups

Auxin mimics

The majority of active substances available for management of weeds in managed amenity turf and amenity grassland are in Herbicide Resistance Action Committee (HRAC) group 4. This group of herbicides works by mimicking auxins, natural plant hormones which help them to grow towards the light. The application of auxin mimics causes the plant to lose control of growth processes and cell division leading to twisting, distortion, thickening and stunting, amongst other symptoms. Auxin mimics tend to be more effective in controlling younger plants.

Group	Active substance	Good for
Phenoxy-carboxylic acids	2,4-D	Annual weeds, buttercups, mouse-ear hawkweed, plantains
	MCPA	Annual weeds, buttercups, sow thistle, creeping thistle
	Mecoprop-P	Annual weeds, cleavers, plantains, procumbent pearlwort
Benzoates	Dicamba	Annual weeds, sow thistles
Pyridine-carboxylates	Clopyralid	Creeping thistle, dandelion, thistles, woody weeds
	Aminopyralid	Creeping thistle, dandelion, thistles, woody weeds
Pyrdiyloxy-carboxylates	Fluroxypyr	Annual weeds (esp. chickweed)
	Triclopyr	Docks, creeping thistle

Inhibition of acetolactate synthase (ALS)

Only one selective active substance authorised for use in managed amenity turf and amenity grassland has a mode of action other than mimicking auxin. That active substance is florasulam which works by inhibiting ALS, an enzyme involved in the creation of amino acids. ALS inhibitors are effective at very low concentrations and are absorbed by both roots and foliage. They are most effective at controlling weeds at an early growth stage.

Group	Active substance	Good for
Triazolo-pyrimidine	Florasulam	Annual weeds, speedwell, mayweeds

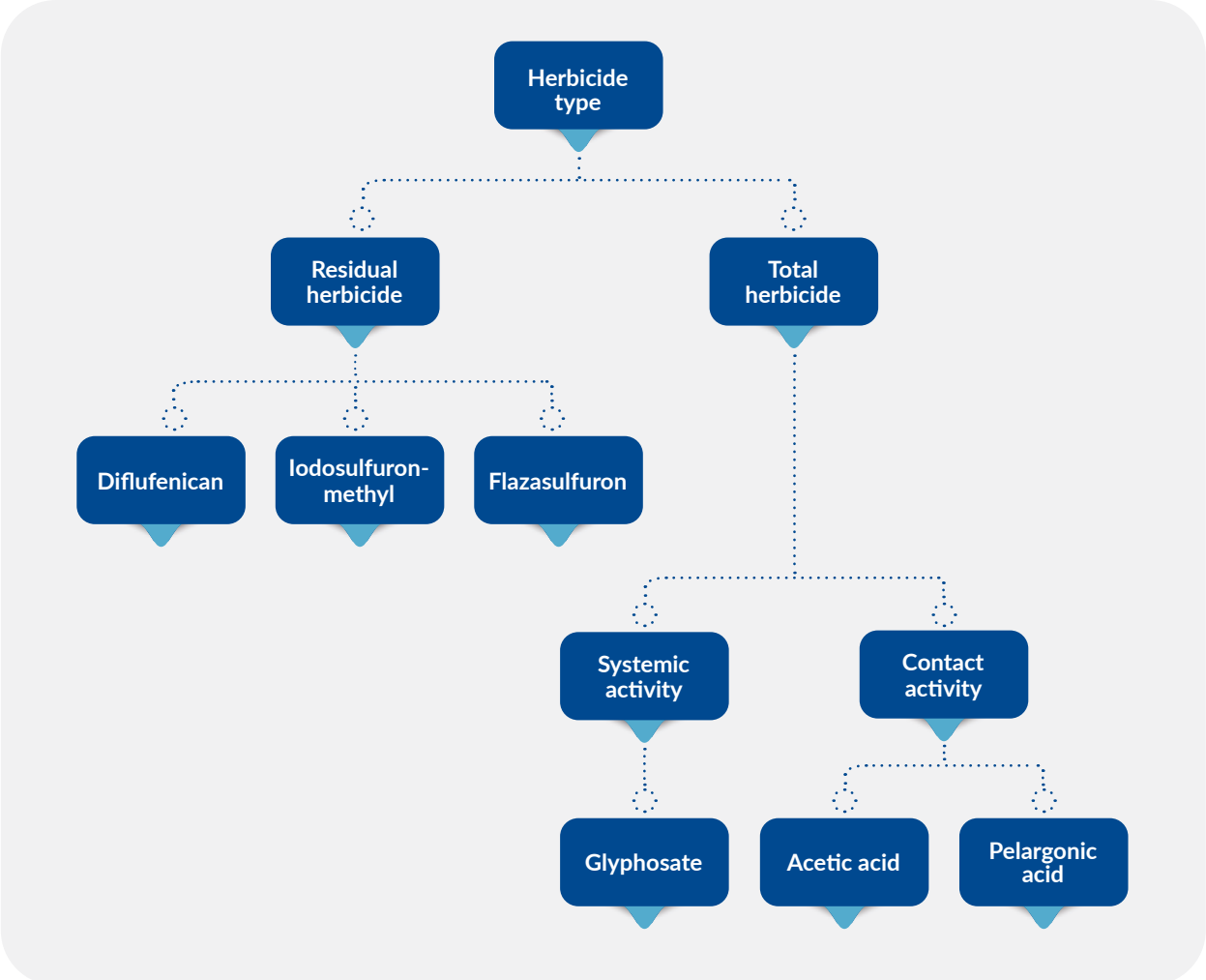
Understanding total and residual herbicides

Total and residual herbicides control both broadleaved plants and grasses on a range of surfaces where plant growth is not desirable. Whilst total herbicides need to come into contact with the unwanted vegetation, residual herbicides are applied to surfaces to prevent plants from emerging and establishing there. Used in conjunction with each other, total and residual herbicides can help to keep surfaces free from weeds and unwanted plant growth.

There are three available residual active substances authorised for use in the amenity industry: diflufenican, iodosulfuron-methyl-sodium and flazasulfuron. All three herbicides work by creating a thin surface layer through which germinating weeds are unable to penetrate. In the case of diflufenican, this is because it causes bleaching of the germinating seedling shoots. In contrast, both flazasulfuron and iodosulfuron-methyl-sodium weaken the germinating seedlings by inhibiting amino acid synthesis.

Total herbicides can be separated into those that work by contact activity only and those that have a systemic activity within the plant. Total herbicides which have **systemic** activity are able to control growth of the whole plant from root to tip as the active substance is translocated from the site of contact throughout the whole plant.

Contact herbicides are effective on seedlings and on annual plants which will struggle to re-grow once the foliage has been affected. Perennial and woody plants are more effectively treated with a systemic herbicide.



Total and residual herbicides

Total herbicides: systemic activity

Roundup® ProActive

Roundup® ProActive is a highly effective formulation of the total contact and systemic herbicide, glyphosate. Roundup® ProActive has been combined with two surfactants to reduce drift, to increase rainfastness, and enhance retention, uptake, and translocation. Roundup® ProActive gives high performance control of unwanted vegetation and can be applied in a wide range of situations including amenity, industrial and aquatic uses. It is an ideal tank mix partner for residual herbicides such as Valdor® Flex on hard and permeable surfaces where long term weed control is required.

Active substances		360g/l glyphosate
Application rate	Conventional spray equipment	1.3-10l/ha in 80-400l/ha water
	ULV applicators	1.3-10l/ha neat
Pack size		5l
Pack coverage		0.5-3.8ha
Application timing		Target weeds and grasses should be actively growing (normally March-October)
Crops		Amenity vegetation, Enclosed waters, Forest, Grassland (destruction), Hard surfaces, Land immediately adjacent to aquatic areas, Open waters, Permeable surfaces overlying soil etc

Roundup® ProVantage

Roundup® ProVantage has all the benefits of Roundup® ProActive but, with a higher concentration of glyphosate in the formulation, it can be applied at lower rates. This improves its environmental profile as packaging waste and transportation emissions are reduced. Roundup® ProVantage is rainfast in as little as 1 hour and has excellent efficacy even in challenging conditions. It can be used in a wide range of situations and is an ideal tank mix partner with residual herbicides such as Valdor® Flex where longer term weed control is required.

Active substances		480g/l glyphosate
Application rate	Conventional spray equipment	1-7l/ha in 80-400l/ha water
	ULV applicators	1-7l/ha neat
Pack size		5l
Pack coverage		0.7-5ha
Application timing		Target weeds and grasses should be actively growing (normally March-October)
Crops		Amenity vegetation, Enclosed waters, Forest, Grassland (destruction), Hard surfaces, Land immediately adjacent to aquatic areas, Open waters, Permeable surfaces overlying soil, etc

Rosate 360 TF

A straight glyphosate formulation which is ideal for contract spraying and other high use requirements. Containing 360 g/l glyphosate, Rosate 360 TF offers effective control of unwanted vegetation when applied during active plant growth. For an enhanced effect, it can be mixed with an adjuvant designed to reduce drift, increase spray retention and improve rainfastness, such as Companion Gold.

Active substances		360g/l glyphosate		
Application rate	Conventional spray equipment	1.5-10l/ha in 80-250l/ha water		
	Rotary atomisers	1.5-10l/ha in 40l/ha water		
	Stem injection	2ml of neat solution per stem		
Pack size		1l	5l	20l
Pack coverage		0.1-0.7ha	0.5-3.3ha	2-13ha
Application timing		Target weeds and grasses should be actively growing (normally March-October)		
Crops		Forest, Grassland (destruction), Hard surfaces, Land immediately adjacent to aquatic areas, Permeable surfaces overlying soil, etc		

Total herbicides: contact activity

Katoun® Gold

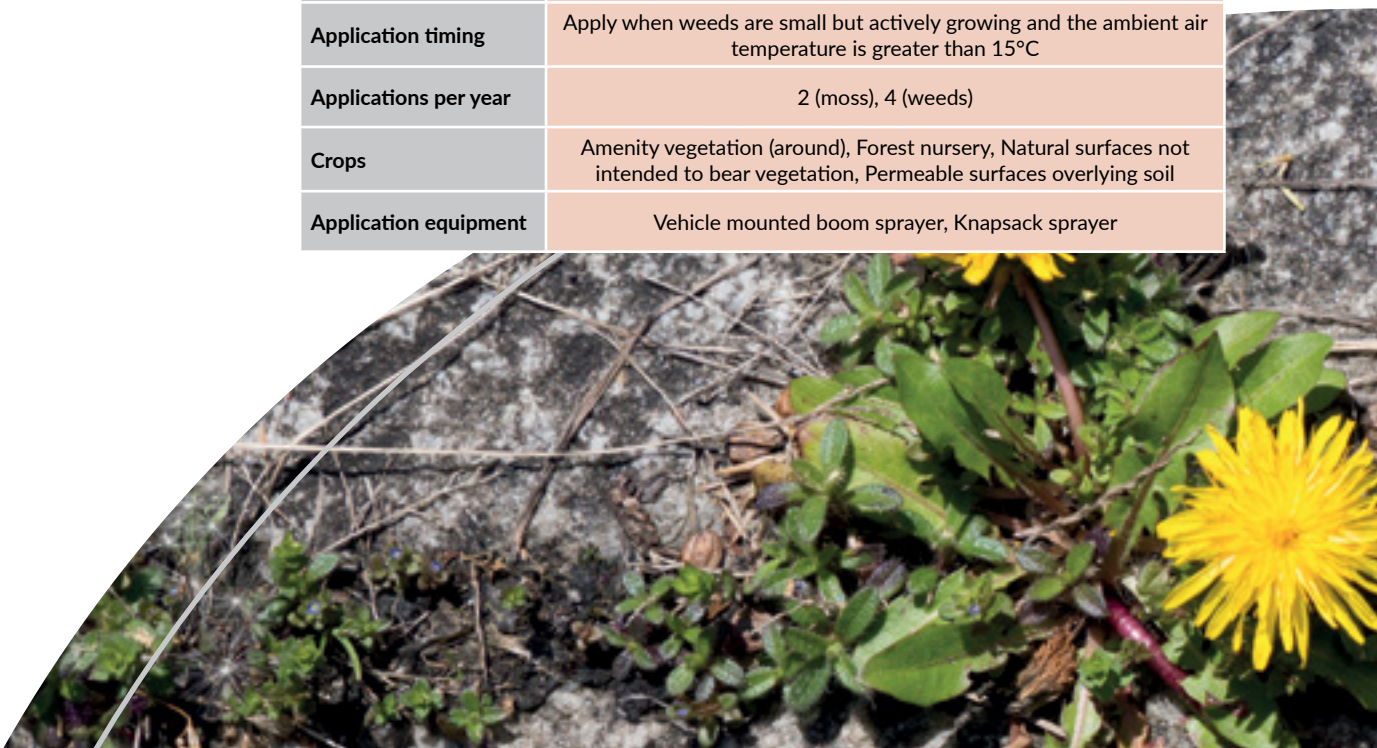
Katoun® Gold is a contact herbicide which can be used to treat broadleaved weeds, grasses and moss. Excellent control of mosses and weeds on natural and permeable surfaces such as gravel paths can be achieved following thorough coverage with Katoun® Gold. Additionally, tank mixes of Katoun® Gold and glyphosate have been shown to provide improved control of difficult to control weeds such as horsetail (Equisetum arvense).

Pelargonic acid, the active substance in Katoun® Gold, is a natural plant-derived oil extract which initiates a chain of events leading to the desiccation and death of plant cells with results being visible within hours. As the product is contact acting, with no residual activity, perennial weeds can regrow, but complete control of annual weeds and newly germinated perennial weeds can be achieved.

Key benefits:

- Controls grasses, broadleaved weeds, and mosses
- Fast acting
- Contains pelargonic acid, a naturally derived active substance

Active substances	500g/l Fatty acids: pelargonic acid
Application rate	18-22.5l/ha
Water volume	200-500l/ha
Pack size	5l
Pack coverage	2,778-2,222m^2
Application timing	Apply when weeds are small but actively growing and the ambient air temperature is greater than 15°C
Applications per year	2 (moss), 4 (weeds)
Crops	Amenity vegetation (around), Forest nursery, Natural surfaces not intended to bear vegetation, Permeable surfaces overlying soil
Application equipment	Vehicle mounted boom sprayer, Knapsack sprayer



Spot On Pro Weed and Moss Killer

Spot On Pro contact herbicide is a non-glyphosate total herbicide containing the active substance, acetic acid. It can be used to treat broadleaved weeds, grasses, and moss. Excellent control of mosses and weeds on natural and permeable surfaces such as gravel paths can be achieved following thorough coverage with Spot On Pro. Complete control of small annual weeds can be expected within 24 hours.

Key benefits:

- Controls grasses, broadleaved weeds, and mosses
- Fast acting
- Can be used all year round
- Approved for use on hard surfaces

Active substances	24% w/w acetic acid
Application rate	25ml/m^2
Water volume	75ml/m^2
Pack size	5l
Pack coverage	200m^2
Application timing	All year round when weeds or moss are visibly present
Applications per year	6
Crops	Hard surfaces, Natural surfaces not intended to bear vegetation, Permeable surfaces overlying soil
Application equipment	Knapsack sprayer

Residual herbicides

Residual herbicides can be used on a range of surfaces where the growth of weeds is not desirable including gravel pathways and drives, porous surfaces alongside roadways, fence lines, and buildings, around trees and shrubs or around outdoor furniture. They provide long-lasting residual activity preventing germinating weed seeds from emerging for up to 5 months. This residual activity reduces the requirement for repeated applications of contact acting or systemic herbicides and of manual vegetation removal by weeding or strimming.

Katana®

Katana® is a residual herbicide containing flazasulfuron for long-term maintenance of weed free surfaces. Katana® can be applied around amenity vegetation, on natural surfaces not intended to bear vegetation, permeable surfaces overlying soil and to railway ballast. The long-lasting residual activity of Katana® means surfaces stay weed-free for up to 5 months, reducing the requirement for follow up applications of contact herbicides or strimming.

Where existing weeds are actively growing, Katana® can be tank mixed with formulations containing glyphosate.

Key benefits:

- Provides long-lasting residual activity of up to 5 months
- Can be tank mixed with glyphosate to treat weeds post-emergence
- Reduces required herbicide application frequency
- Reduces the requirement for strimming

Active substances	25% w/w flazasulfuron
Application rate	150g/ha
Water volume	200-600l/ha
Pack size	50g
Pack coverage	0.3ha
Application timing	For best results apply prior to weed germination or tank mix with glyphosate if applying post germination
Applications per year	1
Crops	Amenity vegetation (around), Hard surfaces (railway ballast only), Natural surfaces no intended to bear vegetation, Permeable surfaces overlying soil
Application equipment	Vehicle mounted boom sprayer, Knapsack sprayer

Valdor® Flex

Valdor® Flex is a residual herbicide containing two active substances to improve efficacy and reduce the likelihood of resistance developing. When applied to a weed-free surface, Valdor® Flex will stop the emergence of germinating weeds for up to four months to ensure a long lasting weed free environment. Where weeds are already present, Valdor® Flex can be tank mixed with glyphosate or a fatty acid such as Katoun® Gold to control existing as well as germinating weeds. Valdor® Flex is available in 500g containers which is sufficient to treat up to 1ha. It is also available in 10 x 10g sachets for a convenient way to treat smaller areas.

Active substances	360g/kg diflufenican, 10g/kg iodosulfuron-methyl-sodium	
Application rate	500g/ha	
Water volume	300-500l/ha	
Pack size	500g	10x10g
Pack coverage	1ha	10x200m^2
Application timing	Apply at any time of year to weed-free soil. If weeds are present tank mix with glyphosate or a fatty acid and apply when weeds are actively growing	
Applications per year	1	
Crops	Amenity vegetation (around) Hard surfaces (railway ballast only) Natural surfaces not intended to bear vegetation Permeable surfaces overlying soil	
Application equipment	Vehicle mounted boom sprayer Knapsack sprayer Spray train (railway ballast only)	

Pistol®

Pistol® contains two active substances: glyphosate to control existing weeds and diflufenican to give a residual activity which provides a barrier to prevent emergence of germinating weeds. Pistol® is rainfast within one hour, increasing the opportunities for application and can help to keep surfaces free from weeds for up to six months.

Key benefits:

- Contains two active substances to control weeds pre and post-emergence
- Rainfast within one hour
- Long-lasting residual action

Active substances	40g/l diflufenican, 250g/l glyphosate	
Application rate	4.5l/ha	
Water volume	200-500l/ha	
Pack size	1l	5l
Pack coverage	0.2ha	1.1ha
Application timing	Apply from February until the end of July when weeds are actively growing	
Applications per year	1	
Crops	Natural surfaces not intended to bear vegetation Permeable surfaces overlying soil Hard surfaces (railway ballast only)	
Application equipment	Vehicle mounted boom sprayer Knapsack sprayer Rotary atomiser	

Pistol is rainfast within one hour, increasing the opportunities for application..

Water management

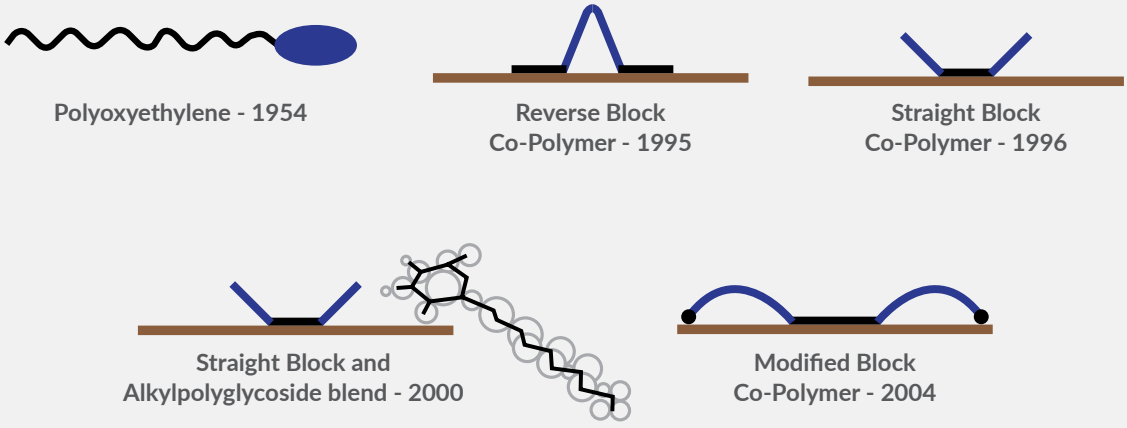
Water is an essential component for producing high quality turf surfaces which are both usable and aesthetically pleasing. However, the presence of either too much or too little water can create problems with grass growth and turf surface management.

Due to the polarity of water, its molecules act like bar magnets pulling in oppositely charged ends of adjacent water molecules to form spherical droplets. Water is also attracted to charged surfaces such as those found on soil particles. On contact, the droplets will coalesce and spread over the surface; eventually soaking deep into the soil due to the attraction from particles lower down. Sometimes dry patches (hydrophobic soil) can occur as waxy secretions from soil fungi that coat the soil particles, making them non-charged so that there is no attraction to water molecules, and infiltration into the soil profile is reduced. Similarly, the surfaces of grass leaves do not always attract water as strongly as other water molecules so that beading on the leaf surface occurs such as when a dew is formed. The dew forming on grass blades can be problematic because it provides good conditions for the spread and expansion of fungal diseases.

Water management products have been designed with the specific properties of water in mind to assist with its movement, retention, or removal in the soil or on the leaf. **Dew dispersants** reduce moisture on the leaf whilst **wetting agents** assist with water movement into the soil and retention within the rootzone.

The active substances that help to manage water movement in both dew dispersants and wetting agents are surfactants. **Anionic surfactants** are negatively charged and as they can move water rapidly are useful as dew dispersants, for moving water deep into the soil profile and for acute treatment of dry spots in turf surfaces, particularly in sandy soils. The majority of water management products contain **non-ionic surfactants**. These include a variety of technologies which can help to move water through, and retain it within, the soil profile. Non-ionic surfactants can reduce water repellence issues in rootzones and soils, improve soil water content and increase plant available water. Finally, **organosilicone surfactants** can reduce the surface tension of water allowing for improved penetration into the soil and better spreading ability on the leaf.

Most widely used turfgrass soil surfactant chemistries



Wetting agents

Aqua-Zorb® Liquid

A concentrated non-ionic soil wetting agent that improves water movement into the soil profile. Aqua-Zorb® Liquid is the ultimate wetting agent that treats the cause of localised dry patch on turf surfaces. In addition to reducing surface tension so that water can move effectively through the soil, Aqua-Zorb® Liquid also removes the waxy coating on hydrophobic soil particles that create localised dry patch. The result is that soil particles are more effectively wetted.

Following the use of Aqua-Zorb® Liquid before or during the growing season root length increases leading to improved nutrient and water uptake and better resilience to summer stresses. Aqua-Zorb® Liquid can be applied throughout the year and is an excellent penetrant when used in the autumn/winter, helping to move water into the soil profile leading to improved drainage and drier, firmer surfaces.

The long-lasting residual technology within Aqua-Zorb® Liquid ensures that a single application persists for up to five months meaning that one application can last all season.

Application rate	10-50l/ha
Water volume	4,000-10,000l/ha
Pack size	10l
Pack coverage	1-0.2ha
Application timing	All year round

How it works:

- Dry patch (hydrophobic soil) is the result of soil fungi secreting a wax which coats the soil particles making them repel water.
- Trials by the STRI demonstrated that Aqua-Zorb® effectively removes the waxy coating on the soil particles and thus allows water to penetrate the soil more effectively.
- Rhizotron studies have shown that greater rooting length occurs following treatment, which reduces effects of summer stress and improves nutrient and water uptake.

A typical scanning electron microscope picture of a sand grain before application of Aqua-Zorb® Liquid, showing the hydrophobic coating

A typical scanning electron microscope picture of a sand grain after treatment by Aqua-Zorb® Liquid, showing very little hydrophobic coating

Key benefits:

- Long-lasting residual technology persists for up to 5 months
- Prevents and cures localised dry patch
- Improves water movement and retention through the soil profile
- Leads to improved root growth, turf colour and turf quality
- Achieves irrigation water reductions of up to 80%

Aqua-Zorb® Liquid is a fantastic product and since using it we are seeing very little dry patch.

Allan Tait
Ashford Manor Golf Club

Aqua-Zorb® Granular

All the benefits of Aqua-Zorb® Liquid in an easy-to-apply, fully biodegradable granule. Containing non-ionic water management technology for the treatment of all hydrophobic soil conditions. One full rate application will last for up to 5 months.

Aqua-Zorb® Granular has been formulated for easy application, providing fast breakdown and penetration. The product can be used alongside cultural aeration practices for the treatment of localised dry patch.

Key benefits:

- Totally biodegradable carrier
- Rapid granule breakdown and fast penetration into the soil
- Long-lasting protection
- Safe to use on all turf varieties and areas including golf course greens, tees and fairways, athletic fields, and residential lawns

Application rate	15-30g/m^2
Pack size	15kg
Pack coverage	0.1-0.05ha
Application timing	All year round

Aqua-Zorb® 45

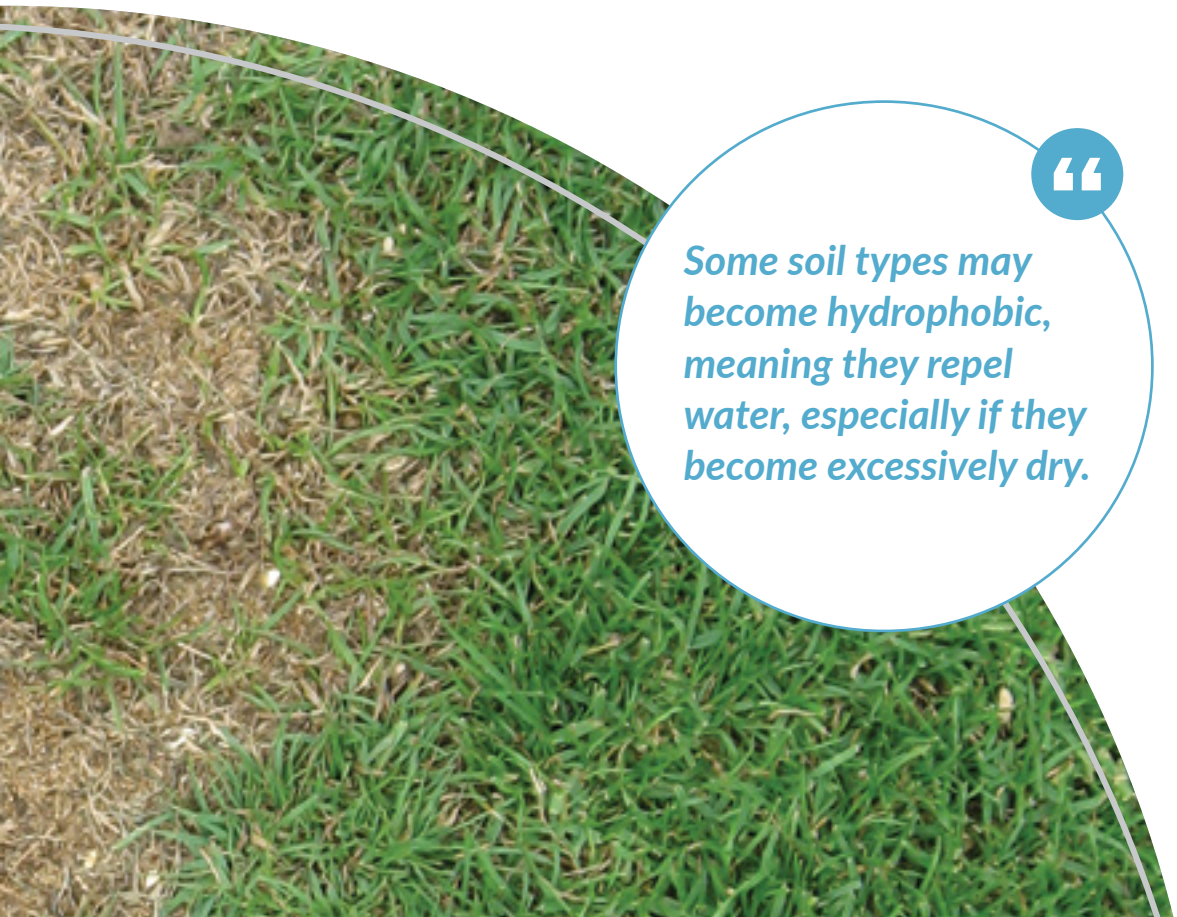
Aqua-Zorb 45 is designed for use in 4-6 weekly maintenance programmes to control localised dry patch and maintain perfect playing conditions. It carries the same proven benefits as Aqua-Zorb Liquid such as water saving and improved drainage. Aqua-Zorb 45 improves turf quality and colour with a special formulation that reduces scorch without loss of effect.

Aqua-Zorb 45 contains very slowly biodegradable chemistry to ensure that it is not leached and remains effective for the full 4-6 weeks even under daily irrigation. Aqua-Zorb 45 is formulated with multiple wetting agent technologies, enabling it to assist with moving water more deeply into the soil profile and retaining water effectively in the soil.

Key benefits:

- Reliable, cost-effective treatment for localised dry patch
- For use in 4-6 weekly programmes
- Slowly biodegradable chemistry
- Dual action of water retention and penetration

Application rate	20l/ha
Pack size	10l
Pack coverage	0.5ha
Application timing	March-September



Some soil types may become hydrophobic, meaning they repel water, especially if they become excessively dry.

Aqua-Zorb® Pellets

For intensive spot treatment of problematic areas that are severely water repellent and suffering from dry patch. Aqua-Zorb® Pellets give greater flexibility in the fight against dry patch and are a simple and effective way of applying wetting agent through a hose-end applicator.

Key benefits:

- Allows for the spot treatment of severely water repellent areas
- Easy to use
- Hose-end pellet formulation
- One pellet treats 3 average sized golf greens (1000-1500m²)

Application rate	1 pellet per 1000-1500m²
Pack size	6 x 240g Pellets
Pack coverage	0.9-0.6ha
Application timing	March-September

Aqua-Zorb® Big Tablet

A wetting agent designed for use with tank irrigation systems. The tablet is dropped into the irrigation water tank, where it will completely dissolve within 4-6 hours. The effervescent action in the formulation results in air bubbles forming on the surface of the tablet, causing it to move around the tank. This unique self-agitating system ensures thorough mixing.

Aqua-Zorb® Big Tablet increases efficiency allowing the introduction of an extra wetting agent into turf management programmes even when time and resources are limited.

Key benefits:

- Special formula for use in irrigation tanks
- Unique self-agitation system
- Ideal for use when time and resources are limited

Application rate	1 tablet/ha
Pack size	One 2.5kg tablet
Pack coverage	1ha
Application timing	March-September

Excel Wetting Agent

Excel is an efficient and cost effective multi-functional, low dose wetting agent, dew dispersant and adjuvant. Formulated with both organosilicone and non-ionic surfactants, Excel lowers surface tension and assists with downwards and spreading movement of water through the soil.

In addition to its action within the soil profile, Excel can help to disperse dew on the turf surface and will improve the uniformity and leaf surface coverage of foliar fertiliser and pesticide applications.

In the spray tank, Excel can facilitate improved mixing by reducing foam formation and acidifying the spray solution. It is ideal for use on larger areas, such as golf fairways, sports pitches and amenity landscapes.

Key benefits:

- Multi-functional wetting agent, dew dispersant and adjuvant
- Improves movement of water into the soil profile
- Disperses dew
- Facilitates improved pesticide application

Application rate	**Soil penetrant and dew dispersant**	1l/ha in 300l water
	Adjuvant and spray additive	150ml per 100l of spray solution
Pack size		1l
Pack coverage		1ha
Application timing		All year round

H2Pro® DewSmart

H2Pro® DewSmart is designed to prevent or reduce the formation of dew on the grass leaf. The formulation contains specifically selected sticking and spreading surfactants that bond to the leaf surface and prevent moisture droplets from forming. Under optimum conditions, a single application of H_2Pro® DewSmart can prevent dew forming for 3-4 weeks, reducing the need to switch/brush the greens on a daily basis, thus saving time.

H2Pro® DewSmart is ideal for use on golf and bowls greens as part of an integrated turf management programme to help minimise the risk of disease outbreaks and improve turf health and quality. Removing dew from greens and other fine turf areas will also assist drying the surface allowing for a cleaner cut.

Key benefits:

- Reduces the need for regular early morning switching
- Greens can be clear of dew for a cleaner cut
- Simple to apply with standard boom sprayer
- Helps to reduce the risk of disease attack when used as part of an integrated turf management programme

Application rate	10l/ha
Water volume	300-400l/ha
Pack size	10l
Pack coverage	1ha
Application timing	When dew is forecast or present (Usually September-March)

agrovista
amenity

Professional amenity solutions

Agrovista Amenity is the main stockists for a wide portfolio of water management products, including the Aquatrols, ICL H2Pro® and Compo Expert Kick ranges.

For more information visit ***www.agrovista.co.uk/amenity*** *or contact your local* ***Amenity Specialist****.*

Adjuvants, conditioners and colourants

Understanding adjuvants and spray additives

Adjuvants and spray additives can be added to the spray tank with the aim of improving mixing, application, or effectiveness of the application. These aims can be divided into four sections:

Water

Additives can be used to facilitate better conditions in the spray tank and during mixing. These types of additives could have the following attributes:

Anti foam – additives that work to eliminate excessive foaming by physically bursting air bubbles and reducing surface tension. They should always be added to the spray tank before the Plant Protection Product (PPP).

- Companion Gold
- Foamless

pH buffers – additives that work to reduce high pH levels in the spray solution to slow down the breakdown (alkaline hydrolysis) of the active substance.

- Companion Gold
- SpraypHix

Water conditioners – additives that work to deactivate and sequester Ca+ and Mg+ cations to reduce water hardness changing the chemistry to prevent salt precipitation and spray blockages.

- Companion Gold

Spray

Certain additives and adjuvants may improve the ability of the spray operative to apply the formulation to the target and reduce application to non-target areas:

Spray drift reduction – additives that reduce the number of fine spray droplets in the application resulting in improved spray deposition on the target.

- Companion Gold
- Grounded AD

Spray pattern indicators – dyes and colourants that give a visual guide to indicate the areas that have been treated and improve application accuracy.

- Eye SPI
- Green Lawnger® range
- Ryder

Residual

For products that need to be applied to the soil, rather than foliage, application can be improved by:

Deposition aids – additives that work to increase the evenness of spray deposition on the soil surface, increasing accuracy of application and adsorption onto soil particles in the target area.

- Grounded AD

Foliar

Additives and adjuvants can be used to improve uptake of PPPs and enhance turf quality through a variety of mechanisms:

Coverage – reduction of the droplet surface tension improves coverage by reducing the number of droplets that bounce off the leaf surface, the amount of run off, and the rate of evaporation.

- Companion Gold
- Roller
- Velocity

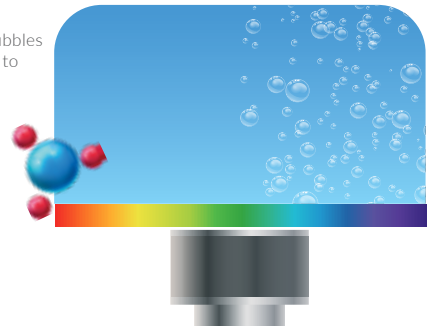
Rainfastness – Applications in narrow spraying windows can be improved by the use of additives or adjuvants that increase adhesion of spray droplets to the leaf surface, thereby improving rainfastness.

- Companion Gold

Colour enhancement – Pigments, dyes and colourants that enhance the visual aesthetic of the turf surface and which may additionally help to protect against damaging UV radiation and excessive light intensity.

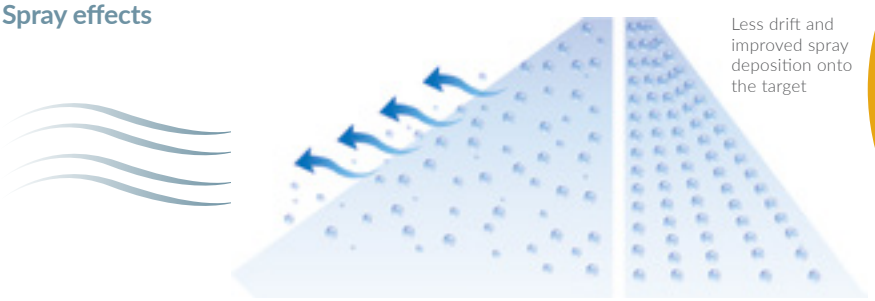
- Green Lawnger range
- Ryder

Water effects

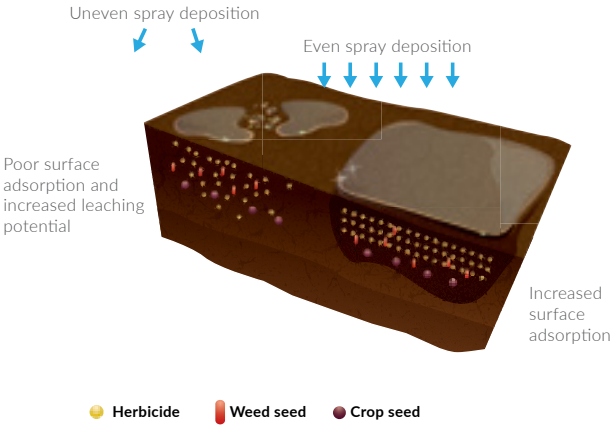


How adjuvants and application aids work

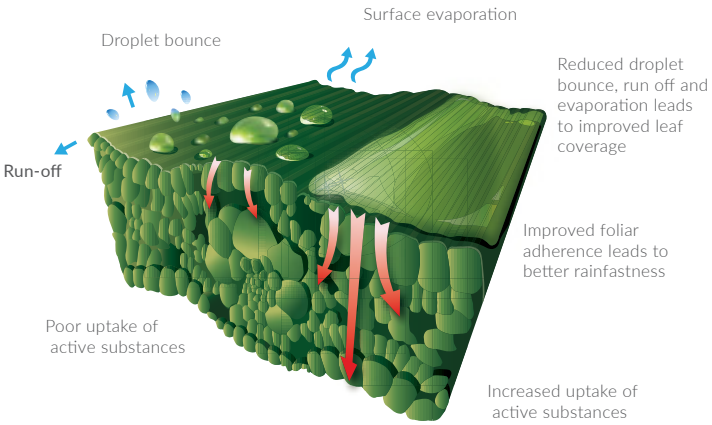
Spray effects



Residual effects



Foliar effects



Product Key

Water
- Companion Gold
- SpraypHix
- Foamless

Spray
- Companion Gold
- Grounded AD
- EyeSpi
- Green Lawnger
- Ryder

Residual
- Grounded AD

Foliar
- Roller
- Velocity
- Green Lawnger
- Ryder

Companion Gold

Companion Gold is a multi-functional adjuvant designed to partner formulations of glyphosate and is approved for use with all authorised plant protection products. Companion Gold contains a unique and complex blend of drift reducing polyacrylamide polymers to ensure that plant protection products stay where they are targeted. Water conditioners, pH buffers, and anti-foam agents work to improve mixing in the spray tank and formulation efficacy. Companion Gold also contains humectants to improve rainfastness and increase the time that the plant protection product is on the leaf and available for uptake.

As a tank mix partner with glyphosate containing herbicides, Companion Gold is proven to increase the rate of weed control and efficacy of the application. Companion Gold is also compatible with other herbicides including 2,4-D, dicamba, mecoprop and MCPA as well as with fungicides and plant growth regulators.

Key benefits:

- Improves efficacy of glyphosate herbicides
- Increases rate of weed control
- Reduces foaming in the tank
- Improves rainfastness and leaf adherence

Active substances	16% w/w ammonium sulphate 0.95% w/w polyacrylamide
Application rate	0.25-1% of spray solution (i.e. 250-1000ml/100l spray solution)
Adjuvant properties	Anti foam, pH bufer, water conditioner, spray drift reduction, coverage, rainfastness

Roller

Roller utilises surfactants and humectants to improve coverage and absorption of foliar applications. By reducing the surface tension of spray droplets Roller improves spreading, resulting in an even coating over the target surface. It can even facilitate better coverage on surfaces that are difficult to wet such as waxy or hairy leaves. In addition to improving coverage, Roller also contains humectants which increase droplet drying time resulting in a better uptake of active substances.

Roller is designed for use with fungicides and is the partner product of choice for products containing azoxystrobin. It can also be used alongside many other fungicides as well as herbicides, insecticides and foliar fertilisers.

Key benefits:

- Improves leaf coverage and spread
- Enhances pesticide uptake
- Excellent compatibility with a wide range of partners

Active substances	Non-ionic surfactants and humectants
Application rate	Up to 0.2% of spray solution
Adjuvant properties	**Coverage**

Velocity

Velocity is designed to enhance fungicide application and efficacy. It can be used with a wide range of turf fungicides but should not be used with products containing azoxystrobin (use Roller instead). The organosilicone surfactants in the formulation ensure excellent coverage whilst humectants work to slow drying, resulting in an increased uptake of the active substances. Velocity helps to reduce spray drift, ensuring that active substances are applied accurately to the target surface.

Key benefits:

- Reduces spray drift ensuring accurate application
- Improves leaf coverage
- Enhances pesticide uptake
- Excellent compatibility with a wide range of partners

Active substances	Organosilicone surfactants and humectants
Application rate	Up to 0.5% of spray solution
Adjuvant properties	Spray drift reduction, coverage

Grounded AD

Grounded AD can be used to improve the application of pre-emergence residual herbicides by reducing spray drift to ensure that the active substance lands where it is needed. Grounded AD is formulated with components that coat the active substance with a charged layer. This means that it holds on to negatively charged particles on the ground more effectively, giving better coverage and helping to keep the active substance on the surface where it can prevent weed emergence. Grounded AD is a useful addition to residual herbicides such as Valdor® Flex and Katana®.

Key benefits:

- Reduces spray drift ensuring accurate application
- Increases soil adsorption of residual herbicides
- Reduces movement of residual herbicides once applied

Active substances	Long chain oils
Application rate	Up to 1% of spray solution
Adjuvant properties	Spray drift reduction, deposition

Foamless

Foamless is a silicone based anti-foaming agent and defoamer. It can be used with all types of spray applied plant protection products (PPP). Foamless helps to reduce the amount of foam that is formed in the spray tank, improving dispersion of the product throughout the spray solution. Foamless should ideally be added to the spray tank prior to the PPP to prevent foam forming but can also be used as an effective defoamer to remove foam that has already developed.

Key benefits:

- Improves the dispersion of plant protection products in the spray tank
- Improves speed and efficiency of spray tank filling
- Removes foam that has already developed in the spray tank

Active substances	Silicone based emulsion
Adjuvant properties	10-20ml in 300-400l
Adjuvant properties	Anti foam

SpraypHix

SpraypHix is designed to acidify the water in the spray tank facilitating better mixing of plant protection products to ensure efficacy and consistency of the spray solution. SpraypHix is particularly useful when partnered with active substances that are prone to degradation through alkaline hydrolysis such as glyphosate and prohexadione-calcium. SpraypHix softens hard water by binding with dissolved salts, such as calcium and magnesium, that can slow down the uptake of active substances. SpraypHix contains a built-in colour indicator to show when the optimum pH of 4-5 has been reached.

Key benefits:

- Acidifies spray tank water to optimum pH levels
- Prevents pesticide degradation in the spray tank
- Reduces pesticide and trace element lock up

Active substances		A blend of phosphoric acid and nonionic surfactants
Application rate	**Soft water**	40-50ml/100l spray water
	Medium hard water	100-180ml/100l spray water
	Very hard water	220ml/100l spray water
Product properties		pH buffer, Water conditioner

Eye SPI

Eye SPI is a temporary spray pattern indicator dye which helps spray operatives to see exactly where they have sprayed. Use of Eye SPI helps to reduce both product overdosing, through overlapping, and underdosing, through missing areas. Eye SPI is non-staining and is available in blue and green tints which can be used to suit the application purpose and environment. It can be used with any plant protection product and with other spray applications such as fertilisers and biostimulants.

Key benefits:

- Assists with visibility of spray treatments
- Reduces risk of overlapping or missing areas
- Non-staining
- Enables identification of blocked nozzles

Active substances	Green or blue indicator dye
Application rate	1-2.5ml/1l spray water
Product properties	Spray pattern indicator

Ryder

Ryder is a turf pigment spray that has multiple purposes for turf applications. It can be used as a spray pattern indicator, as a turf colourant to enhance the visual appeal of the surface and as a protectant to reduce the harmful effects of UV radiation and high light intensity on turf. The colour and protectant effects of Ryder will typically last for 2-3 weeks during the growing season. The pigment can be used alongside any spray applications but is particularly useful with products that can impair turf colour such as plant growth regulators and during periods of high light intensity during the summer months.

Key benefits:

- Assists with visibility of spray treatments
- Enhances turf colour
- Reduces harmful effects from UV radiation and high light intensity

Active substances		Green turf pigments
Application rate	**Mowing height <12mm**	0.75-1.5l/ha in 250-500l/ha water
	Mowing height >12mm	1-2l/ha in 250-500l/ha water
Product properties		Spray pattern indicator, colour enhancement

Green Lawnger®

The Green Lawnger® range of turf colourants can be used to enhance the colour of turf in a range of situations. The natural looking pigments provide instant green up and improve turf appearance.

Green Lawnger is the original colourant in the Green Lawnger® range, it gives an instant and natural looking green up where required. Green Lawnger® is a permanent pigment which will not wear off turf after it has been applied in dry conditions. It is therefore ideal for use on stadia sports turf and other turf surfaces where impact sports are played as the pigment will not transfer to skin or clothing. Green Lawnger® can be used to enhance the appearance of stressed or dormant turf providing a colour boost for up to 14 weeks.

Key benefits:

- Long lasting colour enhancement for turf
- Gives a uniform appearance
- Can be used on impact sports surfaces

Active substances	Pigments, binder and ColorLock™ technology
Application rate	33-100l/ha in 700-2000l/ha water
Product properties	Colour enhancement

Green Lawnger® Pro HC

Green Lawnger® Pro HC is a high-quality visual spraying aid and pigment-based turf colourant. It can be used to provide instant green up with a natural colour and is particularly suited for spring, summer, and autumn conditions. Green Lawnger® Pro HC has been shown to increase soil and surface temperatures, resulting in improved conditions for turf growth early in the growing season. Photosynthesis is also improved due to increased radiation absorbency and decreased reflectance.

Green Lawnger® Pro HC can be used on both fine turf such as golf greens and tees as well as on coarse turf such as racecourses.

Key benefits:

- Improves turf quality during periods of slow growth
- Improves turf appearance instantly
- Dual purpose as a visual spraying aid

Active substances	Pigments and ColorLock™ technology
Application rate	1-3l/ha in at least 300l/ha water
Product properties	Colour enhancement, Spray pattern indicator

Green Lawnger® TR

Green Lawnger® TR can be used as a pigment-based colourant and as a visual spraying aid. It has a darker appearance in comparison to Green Lawnger® Pro HC. It is particularly useful for improving the appearance of turf surfaces during the autumn and winter months.

The dark colour of Green Lawnger® TR increases the absorption of solar radiation, leading to elevated surface temperatures. This helps to support early season turf growth and accelerate ice and snow thawing.

Key benefits:

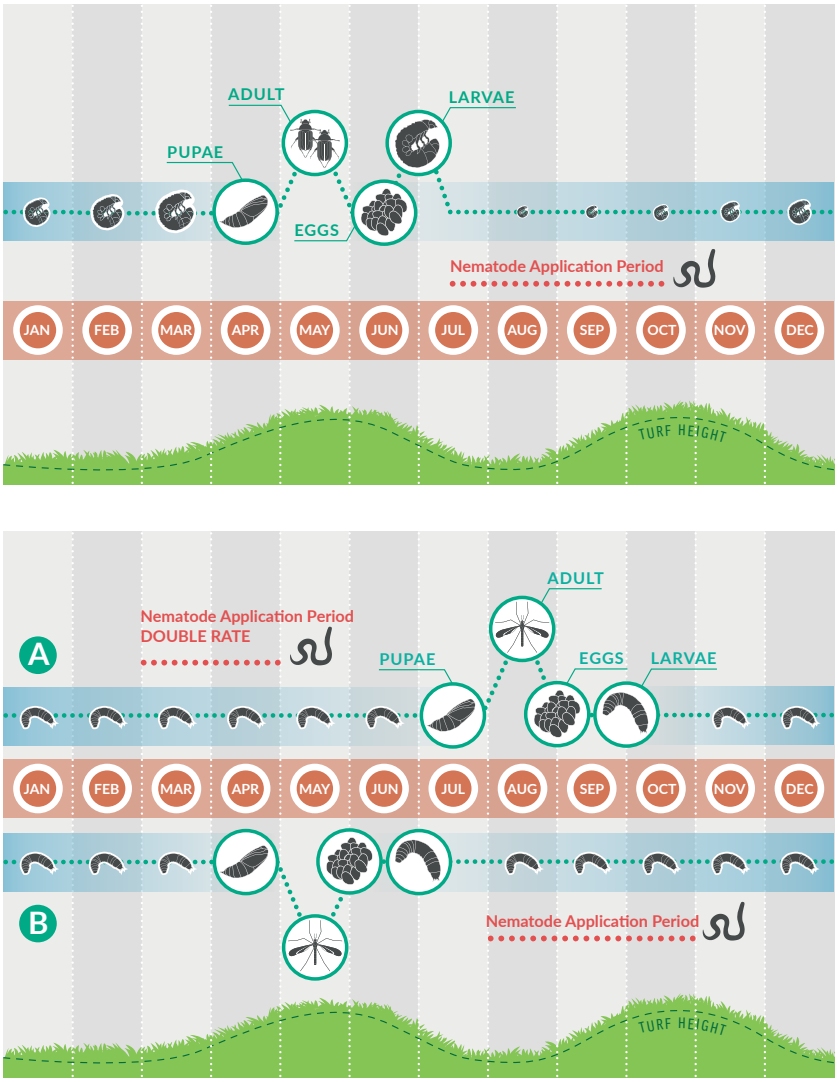
- Supports early season turf growth
- Creates a uniform turf appearance
- Dual purpose as a visual spraying aid

Active substances	Pigments and ColorLock™ technology
Application rate	2-5l/ha in at least 300l/ha water
Product properties	Colour enhancement, Spray pattern indicator

Understanding insecticides and biocontrols

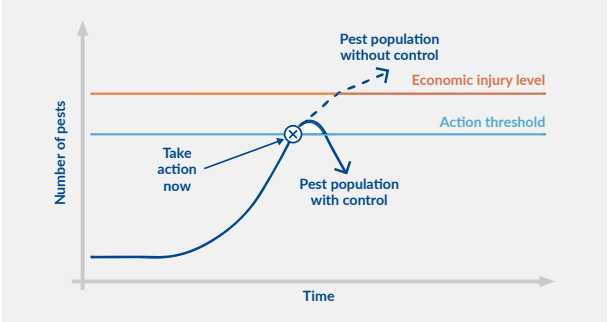
Major damage on turf surfaces can be caused by chafer grubs and by leatherjackets. These larvae cause direct damage by eating the turf roots which leads to weakening of the plant as well as indirect damage through predators disrupting the turf surface in search of food.

Control of these pest species is most effective when an integrated pest management plan is followed. This involves understanding the insect lifecycle to target treatments at the appropriate developmental stage.



Decisions on the precise application period should be taken as part of an integrated pest management plan and be based upon local observations of the pest life cycle.

It is also helpful to set economic injury and action thresholds to guide decisions about when action is required depending upon budget and priority level of the affected surface.



An integrated approach to the control of the major insect pests on turf surfaces may require the use of both biological controls and chemical options as well as tools to monitor pest levels.

Insect control

Acelepryn®

Acelepryn® is a highly effective insecticide which can help to protect managed amenity turf and amenity grassland against the damaging effects of leatherjacket larvae and chafer beetle grubs as part of an integrated turf management strategy. The active substance in Acelepryn®, chlorantraniliprole, works by causing paralysis following ingestion. It is most effective when used against early-stage instars which are actively feeding. Acelepryn® can be used alongside beneficial nematodes to improve control of damaging insect pests.

Key benefits:

- Effective control of actively feeding chafer grubs and leatherjacket larvae
- Can be used as part on an integrated turf management strategy
- Improves the playing quality on managed amenity turf surfaces

Active substances	200g/l chlorantraniliprole	
Application rate	0.6l/ha	
Water volume	500-600l/ha	
Pack size	600ml pack	3l pack
Pack coverage	1ha	5ha
Application timing	Prior to egg hatch, when adult beetles or cranefly numbers are at their peak. Leatherjackets: Generally August-September Chafers: Generally May-July	
Applications per year	1	
Crops	Managed amenity turf	
	Amenity grassland (golf roughs and airfields that are frequently mown)	
Application equipment	Vehicle mounted boom sprayer Knapsack sprayer	

Chafer beetle traps and pheromone lures

There are six chafer beetle species in the UK with the garden chafer (Phyllopertha horticola) being the most damaging to turfgrass. The pheromone lure that is used alongside the chafer beetle trap is specific to this species of chafer beetle and enables the peak adult activity period to be recorded. Treatments to control this pest organism can then be targeted more effectively.

For nematode treatments, application should be timed for 4-5 weeks after the peak adult flying time when the majority of eggs will have hatched. Acelepryn® should be applied during peak adult flight as optimum control is achieved when this product is applied prior to egg hatch.

Key benefits:

- Easy to use
- Refillable
- Enables effective targeting of chafer beetle control treatments

Biological controls

The Sportnem and Nemasys® ranges provide a non-pesticidal approach to the treatment of garden chafer grubs and leatherjacket larvae in managed amenity turf. They can be used as part of an integrated turf management strategy and contain beneficial nematodes which help to control infestations of these common turf pests safely and effectively.

The products in the Sportnem and Nemasys® ranges contain different entomopathogenic nematode species which, whilst generalist in their host ranges, are more suited either to controlling garden chafer grubs or to controlling leatherjackets.

The species *Heterorhabditis bacteriophora* is particularly effective at targeting early-stage instars of chafer beetle grubs. Leatherjackets can be more effectively controlled using the species *Steinernema carpocapsae* or *Steinernema feltiae*. The latter species is slightly more active at lower temperature.

For best effect, tank mix nematodes with a compatible carrier such as Nemaflo and irrigate post application to aid movement into the soil profile. Nematodes can also be used alongside insecticidal control options such as Acelepryn® as part of an integrated approach to turf management.

Key benefits:

- A non-pesticidal approach to insect control in turfgrass
- Can be used in conjunction with Acelepryn®
- A pro-active and preventative approach to controlling chafers and leatherjackets

Active against		**Chafer beetle grubs**		**Leatherjacket larvae**	
Product		Sportnem H	Nemasys® G	Sportnem T	Nemasys® J
Active substances		*Heterorhabditis bacteriophora*		*Steinernema carpocapsae*	*Steinernema feltiae*
Application rate		500,000 nematodes per m^2			
Water volume		0.1l/m^2 plus at least 3l/m^2 post application irrigation			
Pack coverage	50 million nematodes pack	100m^2			
	250 million nematodes pack	500m^2			
	500 million nematodes pack	1000m^2			
Primary application period		Apply when soil temperatures are >14° to early-stage larval instars. Usually July-October		Apply when soil temperatures are >14°C and leatherjacket eggs have hatched. Usually August-October	
Secondary application period		N/A		Apply when soil temperatures are >14°C and leatherjacket larvae are beginning to increase feeding activity. Usually March-April	
Crops		Managed amenity turf Amenity grassland Grassland			
Application equipment		Vehicle mounted boom sprayer Knapsack sprayer			

Nemaflo

Nemaflo is a specifically designed carrier which aids movement of entomopathogenic nematode treatments into the soil profile where the target pest is located. Sufficient soil moisture is also known to have a beneficial effect on the nematodes ability to cause host mortality with carriers such as Nemaflo improving this.

Key benefits:

- Aids movement of nematodes into the soil profile
- Improves efficacy of nematode treatments
- Tank mixable with a wide range of nematode products

Active substances	Non-ionic carrying agent
Application rate	1/ha
Water volume	1000l/ha
Pack size	250ml
Pack coverage	0.25ha
Application timing	Apply with nematodes
Crops	Managed amenity turf Amenity grassland
Application equipment	Vehicle mounted boom sprayer Knapsack sprayer

Moss

Moss, like every living organism, requires moisture. The difference between mosses and other plants is that they do not require a root system for survival, though some produce a structure called rhizoids.

Whilst many take nutrients from the substrate directly beneath them, a lot of mosses can also survive in areas where moisture, and nutrients, pass over the leaf. They are also an organism that, in comparison to grass species, can tolerate shade and poor drainage.

These are special qualities that help us understand why they can be found on most surfaces, even hard surfaces such as roofs and pathways. The high levels of moisture, mild temperatures and a competitive growth habit over the winter period are therefore a major contributing factor to the amount of moss we witness in the early spring.

Mosses are plants that do not have a vascular system. They are part of the order called Bryophytes. As well as mosses, Bryophytes also contain the groups hornworts and liverworts.

After flowering plants and ferns, mosses are the most diverse form of plants, with over 10,000 species in more than 700 genera; nearly twice as many genera as all the mammals on Earth.

In addition to not having a vascular system, they also have no woody parts. The lack of a vascular system makes them susceptible to desiccation and, therefore, they tend to be found in damp, moist and even aquatic habitats, although not exclusively, and some species have remarkable adaptations to very dry habitats.

Moss can be a problem within turf, and the appearance of hard surfaces, such as patios or tennis courts, can be compromised by mosses. These two areas need to be considered separately, as they require different solutions.

Botanically moss species are divided into two categories:

- Pleurocarpous: mosses where the archegonia (female sex organ) are situated along short lateral branches. These species of moss exhibit a spreading growth habit often forming carpets. The growth extends from a single point at the tip of a branch (monopodial) which then branches. Very often this branching is multi-divided (pinnate) and may have a feathery appearance.
- Acrocarpous: denotes mosses where the archegonia are situated at the tips of stems or branches. Generally, acrocarpous mosses do not branch and spread, rather they grow in upright tufts.

Colloquially within the sports turf industry, mosses are often categorised into three descriptive groups, as follows:

- Cushion forming: Tiny upright clusters of growth, those associated with closely mown and scalped turf situations
- Trailing: Feathered looking types of moss, those associated with poor drainage and shade problems
- Upright: Larger tuft type mosses, those associated with drier acidic soils

Moss control, hard surface cleaners and aquatic

Ferromex® Mosskiller Concentrate

Ferromex® Mosskiller Concentrate is a foliar feed and registered herbicide for the control of moss on turf surfaces. It can be used in a wide range of amenity situations, from golf and bowling greens to sports pitches and lawns, wherever problematic moss growth occurs.

Ferromex® Mosskiller Concentrate contains 20% iron sulphate which alters the pH in the moss plant causing enzyme production to stop and consequently killing the moss plant. Once dry, the formulation is rainfast, minimising the risk of unwanted transfer to other surfaces. The formulation also contains 5% ureic nitrogen to promote regrowth of the grass sward after treatment. The formulation is easy to apply and gives excellent control of all types of moss.

Key benefits:

- Contains iron sulphate for effective control of all mosses
- Contains nitrogen for improved grass growth
- Can be applied up to three times per year
- Easy to mix and apply

Active substances	20% iron sulphate + 5.5% nitrogen (w/v)
Application rate	150l/ha
Water volume	500l/ha
Pack size	20l
Pack coverage	1,333m^2
Application timing	Apply to actively growing turf in moist conditions from early spring to early autumn
Applications per year	3
Crops	Amenity grassland Managed amenity turf
Application equipment	Vehicle mounted boom sprayer Knapsack sprayer

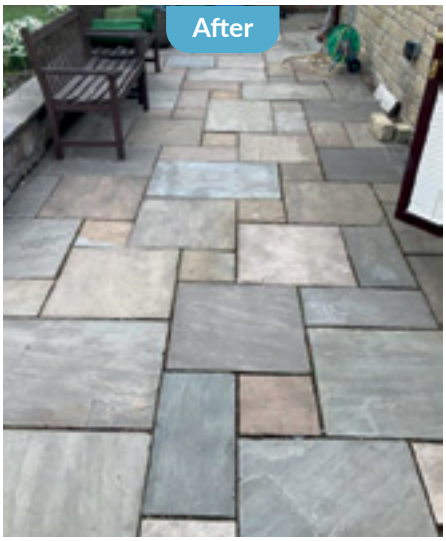
Enclean®

Enclean® is a multi-surface biocide which can be used outdoors on porous and non-porous hard surfaces, on buildings and on building materials. Enclean® contains nonanoic acid which works by destroying cell membranes of algae and other green deposits. Enclean® works rapidly, with results visible just two hours after application. Each application of Enclean® can help to keep surfaces clean and algae free for a number of months.

Nonanoic acid, the active substance in Enclean®, is derived from plant origins, it is non-corrosive and quickly degrades into natural elements post application. The formulation can be used all year round provided that no rain is forecast for at least two hours post-application and the temperature is above freezing.

Key benefits:

- Authorised for use on all outdoor hard surfaces
- Rapidly controls algae and other green deposits
- Long-lasting effect
- Derived from natural ingredients



Active substances	500g/l nonanoic acid
Application rate	18l/ha
Water volume	250l/ha
Pack size	1l
Pack coverage	555m²
Application timing	Can be used all year round
Applications per year	2
Crops	Outdoor porous & non-porous hard surfaces
Application equipment	Vehicle mounted boom sprayer, knapsack sprayer

MMC-Pro

MMC-Pro is a broad-spectrum hard surface cleaner which will control mould and algae on all outdoor hard surfaces. MMC-Pro contains didecyl dimethyl ammonium chloride, a quaternary ammonium compound which helps to remove algae, mould, and other single celled organisms from hard surfaces by disruption of the cell membranes. Results are visible in as little as 24 hours and can last for months.

MMC-Pro has a neutral pH and is readily biodegradable. It can be used all year round as long as the application surface is dry and no rain is forecast within 5-6 hours following application.

Key benefits:

- Effective control of green mould and algae on hard surfaces
- Can be used all year round
- Long lasting results

Active substances	8.9% w/w didecyl dimethyl ammonium chloride	
	Average growth	Light growth
Application rate	29-66ml/m^2	14-33ml/m^2
Water volume	116-264ml/m^2	125-297ml/m^2
Pack size	5l	
Pack coverage	357-78m^2	
Application timing	Can be used all year round	
Crops	All outdoor hard surfaces	
Application equipment	Vehicle mounted boom sprayer Knapsack sprayer	

AlgaphiteBio

AlgaphiteBio is a bacterial inoculant designed for the prevention and treatment of blanketweed and other aquatic algae in ponds and lakes. AlgaphiteBio contains six species of naturally occurring bacteria which feed directly on phosphates and nitrates in the aquatic environment reducing the availability of these nutrients and therefore restricting the growth of blanketweed and algae.

AlgaphiteBio is available in two easy to use formulations which can be selected depending on the size of the water body. A liquid treatment is available for smaller bodies of water. For larger pools and lakes, the biodegradable sachets can be used.

Key benefits:

- Reduces nutrients in the aquatic environment
- Contains naturally occurring nitrate and phosphate reducing bacteria
- Two easy to use formulations available

Active substances	Nitrate and phosphate reducing bacteria	
Application rate	**500ml pack**	**15 x 200g sachets**
	10ml per 250l water	200g per 50m^3 water
Application timing	For best results start using early in the year when water temperatures exceed 10°C	
Applications per year	Continue applying once per month until plant growth stops	
Crops	Enclosed waters	
Application equipment	Watering can Knapsack sprayer Hand application (sachets)	

Blackout

Blackout is a water-based colourant which can be used in lakes, ponds and other enclosed water bodies to create a natural looking reflective water surface. As well as enhancing the aesthetic appearance of the water, Blackout also creates shading. This reduces the growth of algae and aquatic weeds as photosynthesis decreases. The pigments used in Blackout are non-toxic and it can therefore be used in fisheries, fishponds, and in irrigation waters.

Key benefits:

- Creates a natural looking reflective surface on water
- Naturally reduces growth of algae and aquatic weeds
- Non-toxic and suitable for use in irrigation water

Active substances	An aqueous blend of non-hazardous pigments
Pack size	1l
Application rate	2.5-5l/ha of water
Application timing	For best results start using early in the year before algae and aquatic weeds are growing
Applications per year	Continue applying at monthly intervals or as colour effect decreases
Crops	Enclosed waters
Application equipment	Pour required quantity directly into water. Natural movement of the water will disperse the dye. Dispersion can be improved by leaving water features running to increase the circulation of the water.

Disinfectants and sanitisers

Huwa-San

Huwa-San is a highly effective broad-spectrum disinfectant for artificial sports turf, pitches and machinery that is effective against bacteria, fungi, yeast, mould, spores, viruses and mycobacteria.

Huwa-San is used very successfully as a surface disinfectant for artificial sports surfaces such as 3G pitches. It can also be used to sanitise machinery and tools, reducing the risk of contamination between operators and surfaces. Other applications include disinfecting and reducing the build-up of biofilm and blockages in irrigation systems.

Huwa-San is non-corrosive, has no odour, colour, or taste and following active disinfection completely biodegrades meaning that no rinsing is required. The active substance in Huwa-San, hydrogen peroxide, is extremely active against a range of microorganisms including bacteria, fungi and viruses. With a proven half-life of 5 weeks, Huwa-San is further enhanced by the inclusion of ionic silver stabilisation technology which ensures the product is stable in transport, in storage and during use.

Two different formulations of Huwa-San are available; TR-3, a ready to use formulation containing 3% active substance, and TR-50, a concentrate product for professional use containing 50% active substance which requires dilution.

Key benefits:

- Reduces nutrients in the aquatic environment
- Contains naturally occurring nitrate and phosphate reducing bacteria
- Two easy to use formulations available

	Huwa-San TR-3	Huwa-San TR-50
Active substances	3% hydrogen peroxide (H_2O_2)	50% hydrogen peroxide (H_2O_2)
Additional ingredients	Ionic silver stabilisation technology	

Application rates:

			TR-3		TR-50	
Use	**H_2O_2**	**Contact time**	**Rate**	**Water**	**Rate**	**Water**
Artificial sports pitches and hard surfaces	1%	15 minutes	130l/ha	270l/ha	8l/ha	400l/ha
	3%	5 minutes	400l/ha	N/A	24l/ha	380l/ha
Hand tools	0.125%	Immerse for 120 minutes	0.5l	9.5l	25ml	10l
	0.5%	Immerse for 30 minutes	2l	8l	100ml	10l
	1%	Immerse for 15 minutes	3l	7l	200ml	10l
Boot washes	1%	15 minutes	30l	70l	2l	100l
	3%	5 minutes	100	N/A	6l	100l
Irrigation system water treatment	0.001% (10ppm)	Continuous dosage	0.3l	1000l	20ml	1000l
	0.002% (20ppm)	Continuous dosage	0.7l	1000l	40ml	1000l
Water-based sports pitches	0.002% (20ppm)	Continuous dosage	0.7l	1000l	40ml	1000l
Biofilm removal	1%	60 minutes	30l	70l	2l	100l

Jeyes Fluid

Jeyes Fluid is a widely used outdoor cleaner and disinfectant which can be applied to a variety of surfaces to remove dirt, mould, algae, stains, and microorganisms. Jeyes Fluid is a concentrated product containing a blend of active substances. The new clear formulation means Jeyes Fluid can be used on a wider range of surfaces without fear of staining and can even be used for limescale and rust build up removal. Other uses for Jeyes Fluid include unblocking drains, cleaning paths, patios and tarmac, cleaning and disinfecting tools, equipment, and greenhouses. Jeyes Fluid is also a DEFRA approved disinfectant for use against avian influenza.

Key benefits:

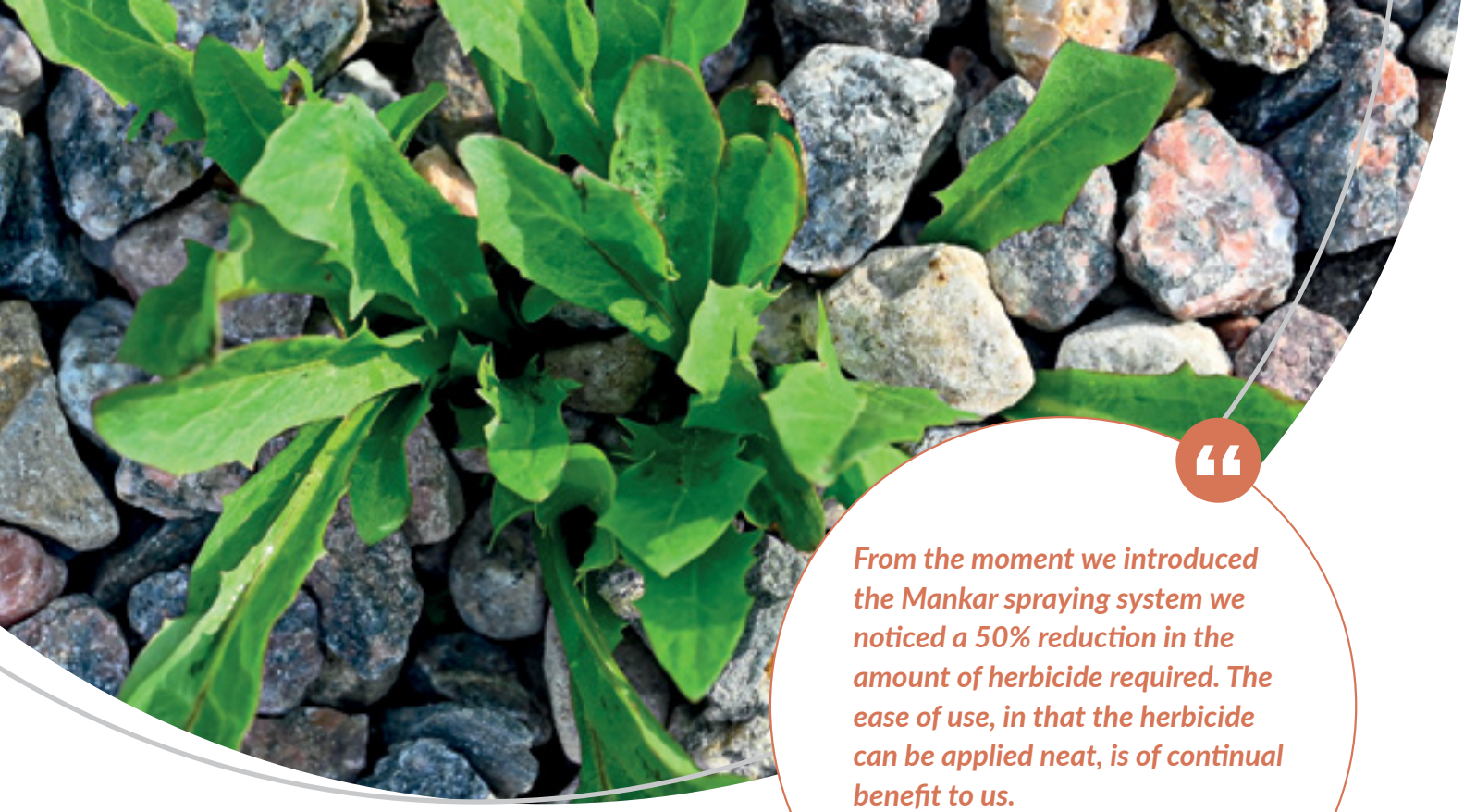
- Effective cleaning and disinfection of hard surfaces, tools and drains
- New colourless formulation
- DEFRA approved for use against avian influenza

Active substances	Alkyl dimethyl benzyl ammonium chloride, Formic acid
Additional ingredients	Non-ionic surfactants, perfume

Application rates:

Use	Method	Rate	Water
Paths, patios & driveways	Scrub with a brush then rinse with water after 30 minutes contact time	1 part	19 parts
Outdoor structures	Wash & rinse immediately		
Hand tools	Apply then rinse off after 5 minutes		
Outdoor drains	Pour neat into outdoor drain then rinse for 5 minutes	N/A	N/A

Sprayers and nozzles

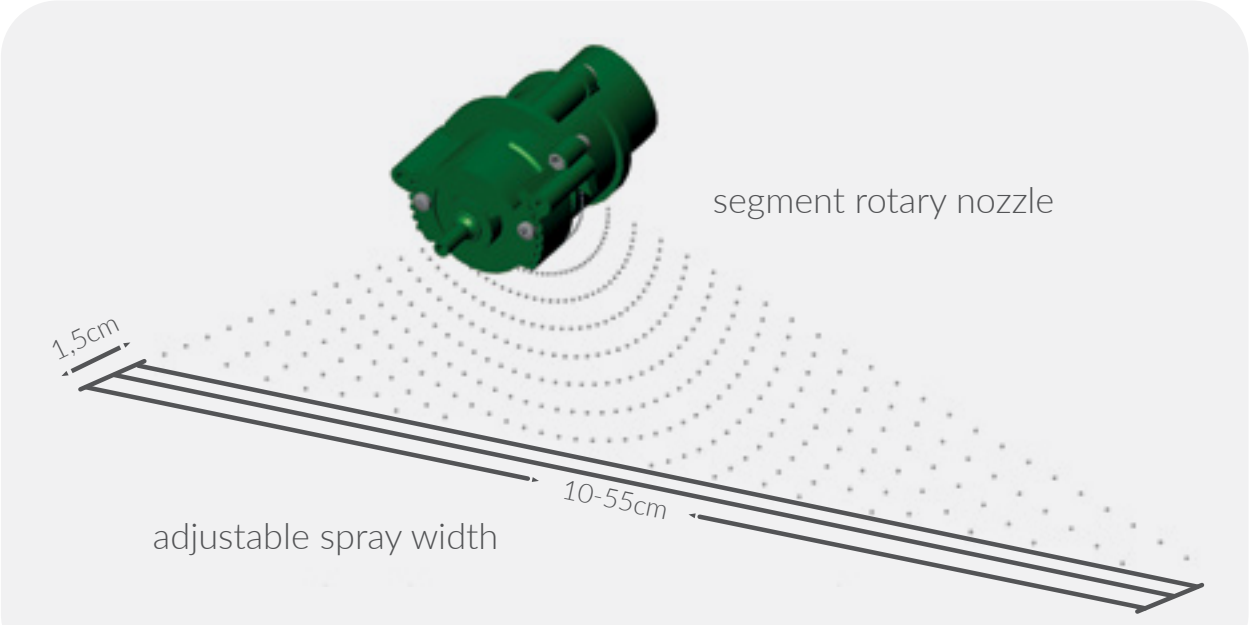


From the moment we introduced the Mankar spraying system we noticed a 50% reduction in the amount of herbicide required. The ease of use, in that the herbicide can be applied neat, is of continual benefit to us.

Southend Borough Council

Mankar® ULV

Mankar® ULV sprayers are based on the “ultra-low volume” technique; through a special segment rotary atomiser, this unique system applies Roundup® ProVantage neat at 2l/ha, saving 50% over conventional sprayers, as well as reducing labour and pesticide use and costs.



Mankar® HQ

The Mankar® HQ handheld lances are well suited for street spraying, dense cultivation, landscape plantings, areas where irregular rows have been planted, or any place where, due to surface properties, a high degree of flexibility is needed.

Product	Spray width	No. nozzles	Tank capacity	Area covered	Weight	Working time
Mankar® HQ45	15-45cm	1	1l	2,500-5,000m²	2.4kg	8 hours

Mankar® Roll Two

Pedestrian powered Mankar® ULV sprayers offer a superbly efficient and environmentally friendly way of spraying large surface areas such as paths, paved areas, back edges or kerbs. They are equally at home in field inter crop row spraying, such as Christmas tree plantations, fruit orchards or vineyards. A single fill of one litre of Roundup® ProVantage will treat 5,000m² without the operator having to stop work in search of water. Roundup® is always applied at the correct dose due to the herbicide being fed by the wheel driven pump, so whatever speed the operator walks at, the correct dose is always applied.

Product	Spray width	No. nozzles	Tank capacity	Area covered	Weight	Working time
Mankar® Two 110 FLEX	70-110cm	2	1l	2,500-5,000m²	24kg	8 hours

Nozzle selection starts here

We supply an extensive range of nozzles to help you get the best out of our products, maximise efficacy, and efficiency.

Contact your amenity specialist to enquire about the best nozzle selection for your needs.

Trojan sprayers

Trojan sprayers are a professional pedestrian sprayer range offering a wide variety of product application onto areas such as golf greens, bowls greens, cricket pitches, sports pitches and ornamental lawns.

Manufactured to the highest standards, Trojan sprayers also offer a comprehensive range of spares available on a next working day service.

> ***The best sprayer I have ever used on bowls greens applying both my nutritional and plant protection products***
>
> *Kevin Brazier*
> *Bowls Contractor - Hertfordshire*

Trojan SPR60

*The **Trojan SPR60** is a three wheel, professional quality pedestrian sprayer.*

It has a 60 litre capacity spray tank that fills the gap between the small pedestrian sprayers and the larger tractor mounted units.

Specification

- 60 litre polythene tank (removable)
- 2 metre, 4 nozzle, removable front folding boom
- Heavy duty battery
- High output pump (14 litres per minute)
- Triple nozzle bodies (Quickfit)
- 3 wheels with pneumatic tyres
- Liquid agitation or spray valve
- Height adjustable handle

Trojan SPR30

*The **Trojan SPR30** is a two wheel, 30 litre capacity professional quality pedestrian sprayer.*

The boom can be moved into an upright position for storage and transportation purposes. The quick fit nozzles are a great time saver, they are easily changed, just twist the unit until the desired nozzle is selected.

Specification

- 30 litre polythene tank (removable)
- 2 metre, 4 nozzle, removable front folding boom
- Quick release coupling for hand lance
- Heavy duty 12 volt battery
- High output pump (14 litres per minute)
- Triple nozzle bodies (Quickfit)
- 2 wheels with pneumatic tyres
- Liquid agitation or spray valve
- Operator can keep the solution in agitation between filling and spraying

Trojan Cub

*Based on the **Trojan SPR30**, the Cub is a professional two wheel sprayer.*

An ideal choice for those on a budget but still looking for an easy-to-use, well built, reliable spraying machine.

Specification

- Removable 30 litre polythene tank
- 2 metre width, with 4 sets of single nozzles
- Removable and height adjustable
- Single nozzles - Quickfit with check valves
- 12 amps per hour battery with integral charging point
- 12v diaphragm pump - 8 litres per minute
- Filtration, preset regulator, main on/off switch

Knapsack sprayers

Agrovista Amenity offers a range of knapsack sprayers suitable for professional or domestic use. Our range includes Cooper Pegler, Berthoud, Osatu and Micron knapsacks.

Manufactured to the highest standards and offering a comprehensive range of spares available on a next working day service.

CP3 Evolution

*The **CP3 Evolution** knapsack sprayer is robust and lightweight with a new, larger 20 litre capacity.*

It is equipped with a new safety harness with an adjustable waist strap and reinforced back resulting in a significant improvement in comfort for the user.

Key features

- Improved comfort due to its two carrying handles
- Its unique diaphragm pump system ensures the longevity of the sprayer, as well as an adequate and precise protection for your crops
- Its built-in pressure relief valve guarantees precision

CP15 Evolution

*The CP15 Classic 15 litre knapsack sprayer has been developed to create the **CP15 Evolution** 15 litre knapsack sprayer.*

As the name suggests, it has evolved to be more user-friendly, and is now equipped with an ergonomic carrying system with comfortable shoulder straps and waist belt to enable you to work better for longer.

Key features

- Ergonomic carrying system
- Ultra-comfortable shoulder straps and waist belt resulting in a significant reduction in discomfort
- Two handles on the tank for easy handling
- Unique membrane pump system ensures a long life and maximum spraying convenience due to its flexible pumping

Osatu Evolution Pro

***Osatu Evolution Professional 20 litre** is a strong and durable knapsack sprayer, complete with a 5 year warranty.*

An ideal choice for those on a budget but still looking for an easy-to-use, well built, reliable spraying machine.

Key features

- 20 litre capacity strong lightweight spray tank
- Viton seal
- Wide base and large pouring mouth
- Pressure regulator with 3 settings

All PPE intended to be used with PPPs or other chemicals should be category III as defined by the Regulation (EU) 2016/425.

DuPont™ Tyvek® Classic 600 Plus green coveralls

DuPont™ Tyvek® 600 Plus green hooded coveralls are robust yet lightweight, spray liquid tight and suitable for using with pesticides.

They provide an ideal balance of protection, durability and comfort with Tyvek® technology protecting against fine particles and fibres. Includes an ultra-low-linting and anti-static treatment.

Key benefits:

- Certified according to regulation (EU) 2016/425
- Chemical protective clothing, category III, Type 4-B, 5-B and 6-B
- EN 14126 (barrier to infective agents)
- Stitched and over-taped seams for protection and strength
- Thumb loops
- Elasticated face, wrists and ankles as well as glued-in elastic waist
- Tyvek® zipper and zipper flap for enhanced protection
- Self-adhesive zipper and chin flap

Sizes:

- M-XXL

DuPont™ Tyvek® Xpert white coveralls

DuPont™ Tyvek® Xpert 500 white hooded coveralls are robust yet lightweight.

They provide an ideal balance of protection, durability and comfort with Tyvek® technology protecting against fine particles and fibres. Includes an ultra-low-linting and anti-static treatment. Particle and limited splash tight, these coveralls are suitable for use to protect clothing from dirt and dust and when using granular products..

Key benefits:

- CAT III. TYPE 5B/6B
- 3-piece hood
- Ergonomic protective design
- Stitched external seams
- Elasticated face, wrists, and ankles as well as glued-in elastic waist
- Tyvek® zipper and flap
- Anti-static

Sizes:

- M-XXL

Ansell Solvex chemical resistant gloves

Ansell Solvex glove has a flocked and lined gauntlet, ideal for safe handling in a wide range of working environments where harsh chemicals are used.

Key benefits:

- Abrasion resistance to protect skin
- Cotton-flock liner for improved comfort and flexibility
- Embossed sand patch finish to enhance grip
- Sanitised - bactericide treatment
- Anti-static to EN1149

Sizes:

- 9, 10

JSP Force 8 compact half mask respirator

JSP Force 8 compact press to check half mask conforms to standard EN 140. Filters can be added as appropriate to protect against dust, mist, vapour, gas or fumes.

Key benefits:

- Force8 twin cartridge half mask with Typhoon valve
- Superior low breathing resistance
- 4-point suspension harness with quick release buckles
- Made with durable thermoplastic rubber, offering a superior fit to most face shapes
- Compatible with the full range of low profile Force 8 filters

Honeywell CV83P Clearways Polycarbonate Visor

High optical quality intended for regular use, protects against medium energy impacts (small object travelling up to 120 metres per second), and provides liquid splash protection.

Key benefits:

- Conforms to EN 166 1-B 3
- Clear visor
- Polycarbonate

Chemical spill kit - clip closed bag

Small and compact clip top bag, easy to carry, suitable for vehicle cabins, small spaces, corridors or small rooms. The kit contains a clear bag with bold spill kit lettering for quick identification. A complete solution to effective spill response. Single use only.

15 litre kit contents::

- 15 x pads
- 1 x 1.2m socks
- 1 x hazardous waste bags
- 1 x clip top bag
- 1 x Instruction sheet
- 1 x Tie

30 litre chemical spill kit contains:

- 25 x pads
- 3 x 1.2m socks
- 3 x hazardous waste bags
- 1 x clip top bag
- 1 x Instruction sheet
- 3 x Tie

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Always read the label and product information before use.

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10/23