

Strike A Pose

BIGGA's Photographic Competition, supported by Syngenta, is back...

syngenta



Calling all budding photographers! Are you proud of your course? Do you catch yourself admiring it in a certain light?

The BIGGA Photographic Competition, supported by Syngenta and back for its fourth year, creates an opportunity for greenkeepers to display their artistic flair, while also earning some publicity for their club.

The winner will receive a full course profile in Greenkeeper International and a special prize, while the 12 best pictures will be selected for the 2010 BIGGA Calendar.

Photographs will be accepted in three

forms. Prints, transparencies, or digitally. Digital pictures must be at 300 dpi (dots per inch) on the camera's highest quality setting, and capable of being scaled up to A3 print size (42cm wide x 29.7cm high). Please note, cropping may occur if photos are to appear in the magazine or calendar. Also please ensure digital photos do not show the time/date display!

Anyone wishing to enter should email them to: tom@bigga.co.uk, entering 'BIGGA PHOTO COMP' as the email subject header.

Alternatively post to: Tom Campbell, BIGGA HOUSE, Aldwark Manor, Alne, York, YO61 1UF by July 31, 2009.

Only BIGGA members are eligible to enter. Please note Syngenta will have access to the winning pictures and will credit them when and if used.

Winning photographs from last year's competition are shown. At the top of the page is the winner, Marriott Meon Valley GC – Looking West by Dean McMenemy.

Above right is Hankley Common GC – Dewying Green by Gareth Roberts, which came second. Below right is Papillion, Montgomerie (Turkey), by Liam Bergin, which came third.

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Focus

on Fungicide Action

Dr Terry Mabbett looks at fungicide and its place in modern turf management

Turf disease control with fungicide looks easy but first impressions are misleading. Unique circumstances pre-dispose turf grasses to diseases which are difficult to control due to specific nature and management of the sports turf environment.

Virtually all turf diseases in the United Kingdom are caused by fungal pathogens. Most are present in thatch even when there is no active disease in the sward.

Microdochium nivale causal pathogen of Fusarium Patch and *Colletotrichum graminicola* (anthracnose) are versatile fungi, living as parasites on living grass plants or as saprophytes on thatch according to prevailing conditions. Horticultural crop debris is generally discouraged but thatch is maintained as a 'cushion' in the playing surface.

Sports turf is subject to continual wear and tear that builds up through spring and summer.

ABOVE:
Close up of Fusarium Patch
(Picture courtesy of Vitax Ltd)

This article comes to you courtesy of the BIGGA Learning and Development Fund.



Grass becomes progressively more stressed and vulnerable to disease with lowest ebb in early autumn just when increasing rainfall, mists and dew start to favour diseases like Fusarium Patch and anthracnose.

Focus on fungicides

Mowing maintains grass as turf but favours disease by wounding leaves and spreading fungal spores and infected grass clippings especially when wet.



Mowing removes green photosynthetic tissue and grass plant's total capacity to manufacture carbohydrate for shoot and root growth. Turf responds to increasingly lower cuts with more tillers but this increases sward density, raises humidity and encourages disease development and spread.

Wounds from mowing breach grass plant defences. Xylem tissue continues to carry water from roots to shoots. Nutrient-rich sap exudates at the severed ends of grass leaves are readily exploited and colonised by fungal pathogens including *Colletotrichum graminicola*, *Rhizoctonia solani* (brown patch) and *Sclerotinia homoeocarpa* (dollar spot).

Disease symptoms appearing in straight lines across turf indicate spores or infected clippings were carried by the mower especially if grass was wet because moist clippings adhere to mower blades and wheels.

Fungicide on the surface or inside the tissue of excised lengths of leaves is lost in the clippings.

When all these factors are considered it is hardly surprising that turf is vulnerable to disease which is

“Fungicide on the surface or inside the tissue of excised lengths of leaves is lost in the clippings”

difficult to manage with fungicide sprays.

Greenkeepers are conversant with fungicide label recommendations but it is helpful to delve deeper than what is said on the packet or in the brochure. This information will graphically describe what can be achieved and the mechanics of getting there, but how the fungicide works is often relayed too simplistically.

Deeper understanding allows greenkeepers to ask more questions and achieve more benefit through their own initiative and best practice. They can develop disease management programmes using a range of complementary fungicides of varying behaviour and modes of action and not necessarily from the same 'stable' and source.

Contact fungicide

First thing to know is how a fungicide behaves physically on turf grass because this determines how it affects the pathogen to prevent or cure disease. Contact fungicides are purely preventative (protectant) in action. They are

sparingly soluble solid chemicals formulated as wettable powders, water dispersible granules or suspension concentrates and which stay on the outside surface of the leaf.

Once in place at adequate concentration and coverage they inhibit or kill germinating fungal spores or fungal hyphae growing out from the thatch. Contact fungicides must be in place on the plant before fungal inoculums arrive and they cannot suppress, cure or eradicate established infections inside leaf tissues because they cannot reach them. By the same token contact fungicides are of little use against pathogens which infect the crown and roots.

Essential requirements for contact fungicides are good coverage and tenacious deposits resistant to rainfall and irrigation or physical removal by high wind and traffic abrasion. Use of recommended spray nozzles and spray volumes should ensure optimum coverage. Use of excessively high spray volumes is generally counter-productive because contact fungicide 'running-off' into soil is not absorbed by the grass roots and is

ABOVE: Turf disease control after an early new year's start in West Sussex

therefore lost and wasted. Choosing a suitable 'window' when wind speed is low, grass is dry and rain not imminent allows spray droplets to impact, dry out and leave tenacious weatherproof deposits on the turf.

Manufacturers can enhance sticking power (tenacity) by micronizing the fungicide to a very fine mean particle size. Number of particles in a set mass (weight) of fungicide will rise exponentially (steeply) as particle size is reduced. This translates into more fungicide particles per unit area of grass leaf and shorter distances between deposited particles, so the entire leaf surface is 'covered' and protected.

The smaller the particle the higher will be its surface area to mass (weight) ratio and therefore the forces of adhesion which



stick particles of fungicide to leaf surfaces. Contact fungicides with a mean particle size (diameter) of around 1µ (micron) are most tenacious and perform best in rain simulation tests.

Manufacturers can also improve tenacity and weatherproof properties by formulating the fungicide with appropriate adjuvants as surface active chemicals.

Contact fungicides possess a brozal action against the pathogen. Fungicidal effect at many points in the fungal metabolism will control a correspondingly wider range of fungal pathogens.

Extended and intensive use of a contact fungicide is therefore less likely to select out (encourage) pathogen populations insensitive to its action. The risk of fungicide resistance is low so there is accordingly less restriction on frequency of use.

Systemic fungicides with curative properties operate by single-site action against the pathogen. There is a much higher risk of fungicide resistance and this is why most are restricted to just one or two treatments per year. The classic contact fungicide used on UK turf is chlo-



rothalonil (phthalonitrile group) available in a range of products and established in the market for many years.

Systemic fungicide

Most modern turf fungicides enter the plant and move around inside to a greater or lesser extent. In UK parlance they are called systemic fungicides, but only those that move from point of entry (leaf or root) into other parts of the plant have true systemic activity and offer all the benefits this brings. Others that move into the leaf but not laterally from the point of entry show trans-laminar activity.

Mesostemic' is a relatively new term describing fungicides that bind to the waxy leaf cuticle and move across the leaf surface as vapour to bind at points away from site of deposition. Penetrant is the term more commonly used in North America to describe all fungicides that move at least some way into the plant and this appears to offer a more appropriate and less confusing description.

Fungicides that move around the entire plant are the only ones that

INSET LEFT: Thatch is an important cushion for turf but also a reservoir of potential grass pathogens

ABOVE: Greens spraying at Tilgate Forest Golf Centre (Crawley, Sussex) and a job well done. Head Greenkeeper Colin Chilvers (Left) and Sprayer Operator, Barry Edwards

can provide a full range of benefits afforded by true systemic activity, but even they are constrained depending on point of entry. First things to know about a systemic fungicide is whether entry is via roots, leaves (or both), how long it remains on the leaf surface before absorption and movement profile once inside in the plant.

Systemic fungicides arrest disease through curative or eradicator action. These terms are interchangeable although some manufacturers try to differentiate by using curative and eradicator to describe fungicide action against vegetative and reproductive phases of the pathogen, respectively.

Systemic fungicides actually inhibit or suppress further development of infections inside grass plants. Curative and eradicator action are well established and widely accepted terms that imply that fungus inside the plant is killed or totally destroyed when actually it is not.

Systemic fungicides will also protect turf by contact action while they remain on the leaf surface, and from inside the plant by preventing entry of germinating spore



about the author

Dr Terry Mabbett has experience in grassland agronomy, and tree protection in forestry, horticulture and amenity. He has worked as consultant and technical writer in these fields for 20 years with a strong focus on pest, disease and weed management



germ tubes or vegetative hyphae. Systemic fungicides may enter the plant through the leaves, the root system or both. Advantages of leaf absorption are quicker entry and additional preventative action while the fungicide remains on the leaf surface.

However, since all truly systemic UK approved turf fungicides show acropetal movement (carried upwards in the xylem or water conducting tissue) there is limited scope for movement inside the plant for fungicide that secures entry through the leaves.

A big advantage of absorption by root system is potential for acropetal movement of the systemic fungicide from the roots and through the plant to tip of every leaf. Systemic fungicides taken up by the roots can establish a reservoir in the root system and crown and replenish fungicide lost when grass is mown and protect post-spray new grass growth from disease.

Systemic fungicide washed off leaves into the soil as run off during spraying or by subsequent rainfall is not necessarily lost like contact fungicides suffering the same fate.

When root absorption is the main mode of entry then spray volumes which are higher than normally

used for purely contact fungicides can prove beneficial. Systemic turf fungicides have been used for around thirty years beginning with benzimidazole group of chemicals. Classic and truly systemic chemicals used on turf today include the triazole fungicides propiconazole and tebuconazole.

More sophistication and complication

Not all turf fungicides fall neatly into purely contact or true systemic action categories. One that does not is iprodione. Iprodione is a long-established and highly valued member of the dicarboximide group of fungicides.

Iprodione is traditionally classed as a contact fungicide but also has curative action which implies a degree of leaf penetration. Iprodione is a contact fungicide apparently showing some local penetration and therefore additional curative action. It is traditionally considered to be multi-site action but, according to STRI, should be reclassified as a single-site action fungicide.

Leaf penetrating fungicides first move into and then through the waxy cuticle that covers the epidermis. Lipophilic (fat loving) fungicide

molecules are best equipped to achieve this. The strobilurin fungicide pyraclostrobin moves rapidly into the cuticle concentrating there to form a reservoir of fungicide that protects the leaf against infection.

As turf disease control becomes more sophisticated so do the fungicides used to carry it out. Mesostemic is the term used to describe fungicides that bind to the waxy leaf cuticle and have extra vapour phase activity facilitating redistribution of fungicide across the leaf surface and subsequent binding away from the initial deposit. The strobilurin fungicide trifloxystrobin falls into this category.

Combining two or three different fungicides within a single product is an increasing feature in the turf fungicide market.

These combination products have a wider spectrum of activity and should control a correspondingly wider range of pathogens and disease.

Products which combine a range fungicide chemistries and biochemical modes of action, with dual contact and curative properties, help minimise risk of pathogen resistance to specific single-site action systemic fungicides.

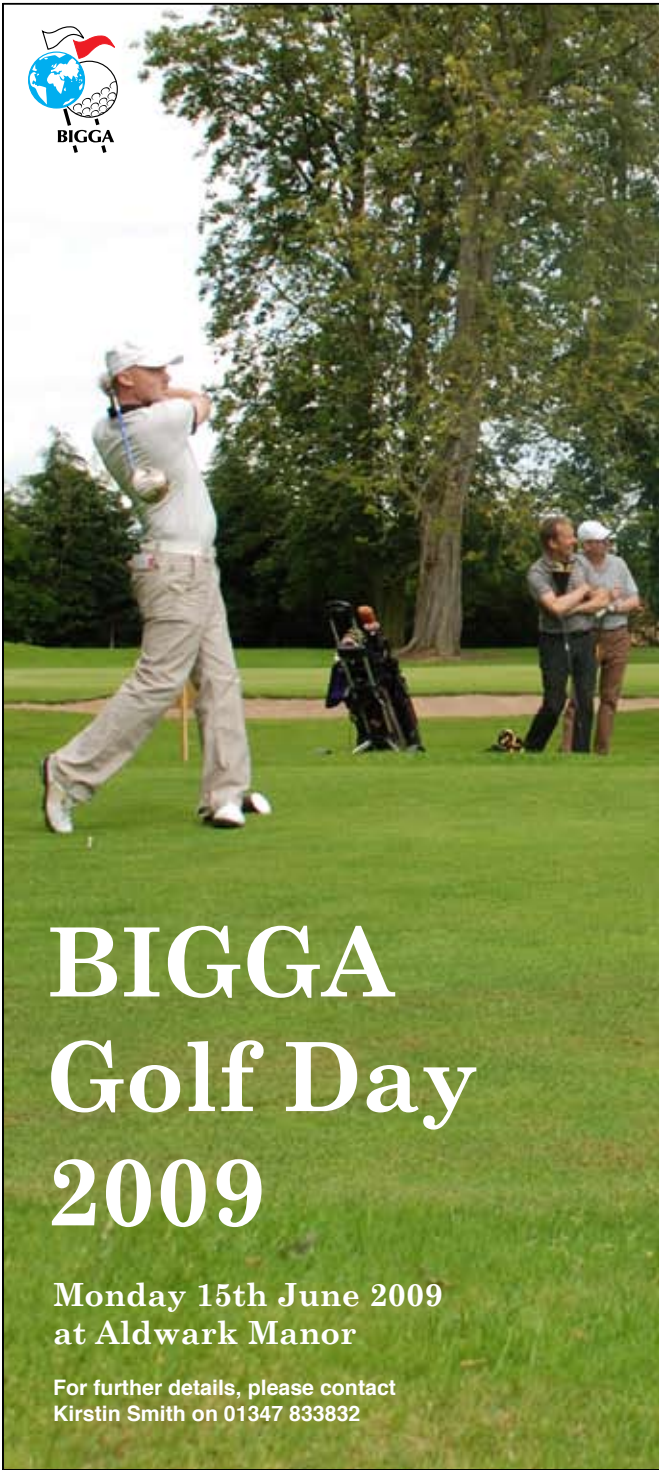
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Handheld Power Tools

make life just that much easier

James de Havilland, writes with his regular insight into current machinery

Hand held power tools, from brush cutters to hedge trimmers through to workshop drills and impact wrenches, continue to evolve.

The key issue is to keep an eye on developments as there may be one item of kit that is a solution to a specific problem you may have.

There are occasions when you are trying to solve one problem that you stumble up against the solution to another. This can be the case when looking for a specific item of equipment.

A trawl through the various cordless impact drivers available lead on to the realisation that there are a growing number of other cordless tools that may help get around specific jobs that have proven a hassle in the past.

As an example, a small bow saw or loppers are ideal for removing light overhanging branches, but it is often the case that the job gets complicated by the need to trim the branch back to remove dangerous cut ends. The job gets more involved, and then the removed material needs to be cut up so it can be easily removed. Before you know it, a five minute job has turned into a 60 minute chore.

With a light and easily portable battery powered chainsaw, you have the ideal next step up from a bow saw. These tools can tackle a reasonably sized branch and cut it off cleanly nearer the trunk or



Impact wrenches not only make some nut twirling jobs faster they also can make jobs easier too. A good example is when unwinding the bolts securing a rotary mower blade. The advantage of a battery powered unit is that it can easily be taken to the mower. The Spaldings Truecraft 13mm (1/2") drive 19.2v cordless impact wrench pictured will not have the same power as a pneumatic equivalent, but it is rated as developing 400 Nm (295 lb-ft) of torque.

larger branch. The same saw will quickly reduce the branch to more easily managed 'lumps'. As long as you remember to keep the battery charged, the saw will be ready at the touch of a button.

An enduring problem with all types of hand held equipment, however, is weight. At present battery powered kit still caters for the lighter end of hedge trimming and sawing. So although the future may see a battery powered brushcutter or hedge trimmer rivalling a petrol powered unit in the future, it could be a long wait. Electric power may not resolve another issue, this being the actual weight of the tool.

What may help with making tools less tiring to use are the backpack mounted support systems from Overton (UK) and DJ Turfcare Equipment. These units essentially use a support cord to take some of the weight of a tool, reduce the load carried by the operator's arms and shoulders. They look a bit odd, but they really do work.

RIGHT: Some items of hand-held equipment are pretty tiring or even tricky to operate. The Easy-Lift from Overton (UK) employs a backpack mounted support arm to take some of the weight of the tool being supported. This makes working with a pole saw much easier. The Easy-Lift can also be operated with other tools to include a brushcutter and hedge trimmer.

FAR RIGHT: The elephant's Trunk from DJ Turfcare Equipment is designed to reduce the weight of handheld equipment to the equivalent of 1Kg - the support system taking some of the tool's weight from the operator's arms and passing it to the backpack. Apart from reducing weight, the vibration passing back to the operator is also reduced.





The Makita BUC121Z 14.4v Li-Ion cordless chainsaw has a cutting capacity of 115mm. Weighing a mere 2.4kg and fitted with an automatic chain oiler, this diminutive unit is small light and portable, making it an ideal unit to carry in a vehicle for small pruning the tasks - often needed when mowing close to trees and shrubs. Note bar end guard. This considerably reduces the chance of kickback.



The Makita BGA450 14.4v Li-Ion 115mm cordless angle grinder can share the same battery as the chainsaw. Suitable for cutting, grinding and sanding, this tool could be ideal for those who need to touch up rotary mower blades on site. Not needing a mains cable also makes it easier to get to difficult to access areas, angle grinders often helping to speed repairs by cutting off stubborn fasteners.



The Makita LXT battery powered blower at first seems a little too small to be of much value to professional operators. A blower, however, is one of those tools that can be used in more ways than its job description. As an example, these tools can be used to help clear debris from a mower radiator, gently blow away clippings that have strayed into a bunker or even clear dew. The fact the tool is cordless improves the chances of it finding a useful job. This unit has a volume flow of 2.3m³/min at a pressure of up to 72m/sec. All from a tool that weights well under 2kg.



Spraying

Nozzle choice keeps spray on target

Application specialist, Tom Robinson, provides some practical tips and advice on nozzle selection from the bewildering range of sizes and designs on offer. Achieving the right spray pattern can help to help achieve the best possible results that will help to make good turf great.

As the final point of delivery, the choice of nozzle influences water volume, spray pressure, droplet size and distribution – all of which ultimately dictate spray coverage on the leaf and, most importantly, spray retention on the intended target.

All nozzles produce a spectrum of droplet sizes, but the proportion of small, medium and coarse droplets will vary. Large nozzles tend to produce more coarse drops, while small nozzles tend to produce more fine drops. Operators can use their choice of nozzle to tailor droplet size to the turf structure and the spray target.

While the conventional flat fan nozzle can do a very acceptable job in most conditions, using the optimum nozzle for the job could make the all important difference between an acceptable 90% control, and an excellent 99% result.

The choice really depends on the target for the spray. Small droplets provide a greater leaf coverage for any given spray volume and are

generally retained well on the leaf surface. When the droplet size is halved, the number of drops produced goes up by a factor of eight, and the coverage of the leaf may be up to four times greater.

Drift control

The problem is that fine droplets are more difficult to control and more likely to result in drift. Dense, fine turf is a very flat, uniform surface with little internal air movement, which makes it a difficult target. Fine droplets just hover above the surface in a boundary layer of air; if there is any wind they can drift off.

Spraying on a still summer evening, when there may be upward thermal currents from the warm soil, these fine droplets can easily be lifted up and carried off - which is another reason why spraying early in the morning is often preferred, and results when there is just a little air movement can be more effective than very still conditions.

If you are spraying longer grass –

such as areas of rough around the golf course or some amenity situations - then the canopy can create its own vortex, which effectively sucks down the spray droplets.

Turbulence generated by the sprayer itself is also generally bad news. If you double the forward speed the turbulence is increased by a factor of four, which may make it harder for small droplets to break out of the air flow and land on the target. It is a factor to consider when moving to faster forward speeds.

In general, you will be able to go faster and in a wider range of conditions with nozzles producing larger droplets, as there is less risk of turbulence and drift. Larger drops also have greater velocity to improve penetration of dense turf. So if you are looking to target disease pathogens at the soil surface, such as Heritage for Take All or Fairy Ring, and for liquid fertilisers they may be an ideal choice.

In the past, the velocity of large droplets has resulted in droplets literally bouncing off the target or running off over-wet leaves, espe-



about the author

Tom Robinson is the Spray Application Specialist with Syngenta Turf & Amenity. Further results and information on the nozzle developments – along with a range of other spray application advice - can be found on the GreenCast website Application Zone: www.greencast.co.uk

Key points for nozzle selection

- Change nozzles to match spray target and conditions
- Air induction nozzles can reduce risk of spray drift
- Leaf coverage is important for contact foliar fungicides
- High velocity nozzles can increase penetration through dense turf
- Reduced water volume can improve timeliness of applications