

Grease Lightning

Tim Lansdell makes the case for using a new range of bio oils in turf maintenance equipment.

Why should anyone want to use biodegradable oil in turf maintenance machinery? Why not, if it is formulated with the correct performance level, function and viscosity grade for its given application and is biodegradable and non-toxic. And, in my opinion, it's the right thing to do! The problem with mineral oil is that it is persistent; it does not readily biodegrade; it's toxic and most importantly it's non-renewable. The cost of remediation is expensive; there's clean up costs, downtime of equipment and possible fines from legislative bodies.

Clean up costs for Bio Oil spills are less, it comes from renewable sources and can mitigate sanctions and possible fines. It helps to preserve our environment and can have enhanced performance properties over mineral oil. Before further exploring the benefits of Bio Oil, it's worth reviewing the effects to grass plants when exposed to mineral oil.

Heat Shock: If oil from operating equipment spills or leaks the first effect is a 'heat shock' of the plant. When leaked onto the leaf, the leaf typically discolours (green to yellow) and wilts. However, the stem and root may not be affected by heat shock. If the oil spillage is minor and a small amount of oil covers only the leaf, does not migrate further down the plant to coat the stem and root and then settle into the soil, the leaf will regenerate and discoloration will disappear (yellow to green). This occurs over one to three weeks, typically.



Turf Kill: If the plant is exposed to a sufficient amount of oil, the leaf, stem and root will be coated with an oil film. This will cause the worst case scenario regarding oil spill effects. An oil film on a leaf will block the tiny leaf pores, stopping gas and moisture diffusion between the leaf and atmosphere, as well as prohibiting photosynthesis. Oil coating a root will stop the soil water and oxygen absorption process between the soil and plant. If the oil coating remains on the leaf and root for a sufficient amount of time the plant will suffocate and die, typically within a week.

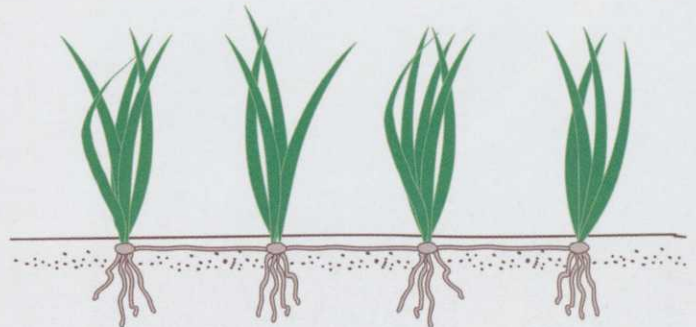
Soil Contamination: Another effect from significant oil exposure is the effect on the soil. Mineral oil is a known toxic material to living things. When sufficient oil is released into soil, the previously discussed plant effects occur. But, more importantly, the presence of mineral oil in the soil causes a 'sterilisation' of the soil, which causes a decrease in the level of micro-organisms present therein. Grass plant regeneration into the sterilised area is highly unlikely and the soil in a mineral oil spill zone must typically be removed and replaced so that reseeding of the region can be done.

Biodegradability is the natural breakdown of living matter, by micro-organisms found in water and soil, to the basic components of carbon dioxide and water. Environmental conditions of temperature, humidity, rainfall, micro-organisms and soil type will affect biodegradation. Mineral oil will

biodegrade and its rate of biodegradation in soil will typically occur over a period of one to two years. Conversely, other oils, such as natural esters (vegetable oils) or synthetic esters, biodegrade over a two to three week period.

For this reason, biodegradable lubricants are finding more and more use in spill sensitive applications. They minimise the turf kill effects on grass because they essentially disappear fast enough (biodegrade) to allow the grass to regenerate.

There is one important caveat to this and is specific to the type of grass species affected. A grass plant will die due to the suffocating effect of oil on its leaf, stem and root systems and this will occur whether the oil is a biodegradable or mineral type. However, after a few weeks a biodegradable oil will become decomposed by micro-organisms in the soil and this will allow the grass to regenerate.



A rhizome type grass system, such as Bermuda or Bent, is completely self generating after exposure to a bio oil spill because the subsurface root structure develops nodes that sprout new grass seedlings in a continuous later propagation. Once the oil in the affect area has biodegraded, the rhizomes will begin to regenerate. This will be observed as new grass sprouting.

For non-rhizome grass types, this self regeneration is just not possible. Once an individual grass plant is suffocated, there is no way it can regenerate. The solution, in this instance, is to reseed the affected area after 30 days following a bio oil exposure. Reseeding post petroleum oil exposure would not be possible for years without soil remediation.

Inevitably, oil leakages into the golf course environment will occur. To minimise the environmental effects of this exposure a number of approaches can be employed:

- The use of biodegradable oils to replace mineral oil in lubricant applications.
- Spill remediation aids, such as soaps or cleaning to 'wash away' oil. Topical oil absorbents to 'suck up' the oil.
- Well maintained equipment to minimise leakage risk.

Hopefully, by understanding and appreciating how different oils react with the environment together with a proper plan and management of equipment and lubricants, turf kill from oil can successfully be minimised.

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On the Money

Jeff Perris and Ruth Mann investigate the increase in the amount of dollar spot appearing on golf courses.

During the past few months, some advisory staff have seen a noticeable increase in the amount of dollar spot on golf courses. Over the years this disease has been observed from time to time, particularly on bowling greens, and especially those that still have a significant red fescue content from previous establishment with Cumberland or sea washed turf.



Golf courses in the south of the country seem to have borne the brunt of the increase in dollar spot disease outbreaks which have been prevalent on a wide range of turf composition, but with fescue dominated fairway turf suffering particularly badly. I have recently visited a well known golf club where most fairways on one of their courses were very badly affected, to the point where if you threw your hat down, it would cover a dollar spot patch! Worrying times for the Courses Manager at this particular club where several greens (comprising bent and annual meadow grass) were also showing signs of the disease.

I have also come across situations this summer where there has been what I would describe as 'background' dollar spot where the turf is not showing the classic dollar spot appearance. Indeed, in such instances greenkeepers and others have thought the condition was red thread or even turf that was just showing some dieback from localised dryness

Without doubt the weather this summer has triggered the dollar spot problem but if such weather conditions are to become increasingly common as part of our changing weather pattern, then I think greenkeepers have a worrying time ahead. Heaven forbid, however, that that we end up like the United States, where dollar spot is such a problem on many of their golf courses that regular and persistent fungicide treatment is carried out during high-risk periods to try and keep the problem at bay.

In view of the situation, Dr Ruth Mann, our Plant Pathologist, has prepared the following notes, which explain more about the disease and its treatment.

The symptoms of dollar spot are pale, bleached lesions on the leaves with a reddish-brown band usually found separating the affected tissue from the healthy green tissue. Small (dollar size) spots of bleached turf occur on close mown grass. These spots reduce the aesthetic appearance of the golf green and create an uneven surface causing non-uniform ball roll.



Dollar spot on bent/fescue tee



Dollar spot on an annual meadow grass green

The spots may coalesce to form large areas of affected turf. White mycelium may be present on affected areas on dewy mornings and disappears as the leaves dry. In the UK, dollar spot is most commonly found affecting *Festuca* spp. Factors which encourage the development and spread of dollar spot include heavy morning dews; areas of turf that do not receive morning sun or suffer from a lack of air movement due to surrounding obstructions (this allows the turf surface to remain moist for longer); daytime temperatures of 15 - 25°C; low fertility; and excessively low cutting heights.

To prevent and control dollar spot minimising leaf wetness is an important practice. By reducing the period a leaf stays wet, the potential for infection is reduced. Altering management practices can reduce the period of leaf wetness. Therefore, during dry periods, irrigation should occur as close to dawn as possible.

Greens can then be switched first thing in the morning to remove any surface water, reducing the period of leaf wetness. Irrigation should be supplied infrequently and to thoroughly wet the profile rather than frequent light irrigations. It is important to reduce shaded areas and improve air movement in order to reduce the drying time of the sward.

This can be achieved by the selective pruning or removal of surrounding vegetation. Low nutrition (particularly low nitrogen) has also been found to promote dollar spot so appropriate fertiliser regimes should be adopted. It may be advisable, during times of high disease pressure, to increase the height of cut of the sward in order to promote grass growth and reduce stress.

Regular aeration is required in compacted areas as this also reduces stress and has been found to reduce the susceptibility of the turf to dollar spot. If cultural control measures are unsuccessful there are several chemical controls available.

These include carbendazim (such as Mascot Systemic from Rigby Taylor and Turfclear from Scotts); chlorothalonil (Daconil Turf from Scotts and Fusonil Turf from Rigby Taylor); fenarimol (Rimidin from Rigby Taylor); iprodione (Chipco Green from Bayer Environmental Science and Amenitywise Iprodione Green from Standon Chemicals); pyraclostrobin (Insignia from Vitax) and thiophanate-methyl (Mildothane Turf Liquid from Bayer Environmental Science and Snare from Headland Amenity).

Fungicide resistance is of major concern when controlling dollar spot. All precautions to prevent resistance should be applied, including correct identification, rotation of active ingredients with different modes of action and employing all possible cultural controls to help reduce the disease pressure. Please remember when using fungicides to adhere to label recommendations and ensure all COSHH regulations are applied.

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Polaris offer downhill engine braking as an option on its Ranger models. Although this feature may not be necessary on a golf course, vehicles used to access steep terrain will benefit from this feature. Ranger has a bench up front, with room for three



Full Throttle

James de Havilland test drives the latest utility vehicles.

When it comes to choosing a diesel or petrol powered utility vehicle, choice can initially make selecting the right machine appear difficult. But setting out a few demands can make the job a lot easier. It used to be pretty easy to choose a non-electric utility vehicle simply because there were not that many models to choose from. With key players now including AUSA, Club Car, John Deere, Kawasaki, Kubota, Polaris, Toro and Yamaha, there is more choice than ever. Of equal importance, these vehicles have evolved, with a growing choice of diesel powered models.

Before taking a quick look at what is on offer, it pays to work out the key demands for the machine. Although the vehicles on offer superficially have a great deal in common, there are details that make it far easier to select those that will fit a given need. An easy starting point is, of course, budget, so let's start with the lowest list price vehicle in this sector, the Kawasaki Mule 600.

Recently introduced to replace the 550 model, the Mule 600 is a 2WD unit with rear differential lock, single range CVT automatic transmission, 181kg cargo capacity with power coming from a nominal 12.5hp 400cc petrol engine. This is priced at £5,150 and although it is a couple of

hundred pounds more expensive than the model it replaces, the 600 is a much improved tool, the increase in engine size leading to a more relaxed drive and possibly better fuel consumption. The outgoing 550 needed plenty of revs to get going and keep running.

The lowest 'list' price diesel model currently on offer is the Club Car Carryall 294. This has a price of around £7,250, this buying automatically selected four wheel drive, 363kg load capacity, self tipping body and individual seats for two. To put it crudely, this is as near a direct competitor as possible to the ubiquitous Mule 3100 4x4 diesel. Although a Mule 'feels' a more complete product in terms of the overall package, it is more expensive and some of the features, such as manually locking differentials, are not necessarily of value on a golf course. So, if the Mule 3100 is on the shortlist, the Club Car should be added too. It is well priced and from a proven supplier.

Sticking with the fuel used to power the vehicle, it is established that petrol utility vehicles have a lower like for like list price than an equivalent diesel. Not so long ago, it was quite easy to argue the case for petrol power, the lower initial capital cost of a given vehicle outweighing the economy advantage offered by a diesel running on rebated red 'diesel'.



With 4WD engaged and differentials locked, a Kawasaki Mule will make light of slippery inclines. The diesel powered 3100 is the pick of the range for overall economy, its three cylinder 23hp engine having ample power for most users. Ease off the throttle, and fuel use is greatly reduced.

Full Throttle

Although the price ratio of petrol versus gas oil has not necessarily altered, fuel prices are climbing alarmingly. Even allowing for reclaimed VAT, unleaded is still 80p per litre or more. Now put this next to fuel consumption. The writer ran a nominal 30hp 400cc petrol powered utility vehicle over an extended period and recorded sub 10mpg fuel consumption. A 'gas oil' burning 20hp diesel run alongside drank rebated 'red' diesel at a considerable 13mpg. But it does not take an economist to work out the running cost advantage of the diesel running on rebated gas oil at perhaps 36p/litre.

As an aside, few users actually monitor the amount of fuel used by any item of equipment. But it can be a real eye opener to see just how much fuel some kit can guzzle. Utility vehicles tend to be operated flat out, particularly models governed to a 20 or 25mph top speed. Run in this way, even the most frugal of units is likely to struggle to better 25mpg.

Gentle acceleration, and backing off on the throttle to cut the engine speed once rolling, has a marked effect on fuel use. The same models as previously mentioned that drank in the sub 15mpg saloon achieved 19.6 and 23.2 mpg respectively when driven with a degree of care. This was over the same terrain and with the same load. An added bonus is that throttling back can reduce the racket generated by the engine, leading to a more relaxed ride. Of equal importance, speeds tend not to suffer too much unless scaling a steep slope or running a heavy load.

So does petrol power rule itself out on a cost basis? Not necessarily. Jump from a diesel to a petrol powered model of otherwise similar overall specification and the chances are the unleaded fuelled vehicle will seem quieter, smoother and offer more 'pep'. Also, petrol engines are currently fitted to models that arguably offer the best ability in really severe going. This may be an issue if there is a need to access hard to reach areas.

At this point, mention should be made of mains charged electric vehicles. These are not covered specifically within this article, but some models, such as variants of the Yamaha U-Max, Club Car, Toro Workman and Deere Gator are offered with battery power. It is easy to get tripped up when looking into this form of motive power, but courses that want to make this energy source work will find it offers a number of advantages. It is not necessarily cheaper, but electric, and hybrid electric power, is the future. It is well worth giving an electric utility a try over a few days in winter. Cold weather will tend to shorten the vehicles range per charge, so giving a good idea of what can be expected in terms of range.



Club Car has introduced its Carryall 294 as a direct competitor to the diesel Mule 3100. Fitted with 'IntelliTrak' 4WD engagement and limited slip differentials front and rear, it will access difficult to reach areas. Perspex screen and roof offer useful protection, full cabs coming as an option



Yamaha caters for a wide range of users with its choice of Rhino and U-Max models. The U-Max comes with a choice of petrol or electric power, the powerful Rhino, pictured, offering sprightly performance.



John Deere have won a large slice of the utility vehicle sector with its Gator models, but up until the introduction of the HPX models, none were aimed at tackling really tough off road conditions. Note the increased ground clearance



Latest 'convertible' Mule 3100 has seats for four, the rear bench tilting to offer an increased load area. Such is the variety of choice in the utility sector that it is easy to get side tracked; think of the demand and buy accordingly



Toro has restyled its Workman range, the latest models continuing to be offered in both medium and heavy duty versions with a choice of petrol, diesel and electric power. A wide track, fat tyres and low load height are key features of medium capacity models

Straw bales are not a typical golf course load, but hauling them around clearly shows the advantage of a low load height. It is all too easy to overlook this when changing to a different make or model

Moving on, the next issue will be seating capacity. All utility models considered in this article will carry at least two, but the Polaris Ranger has a three person bench, with lap belts for all. Kawasaki is in the process of launching a four person Mule, a folding rear bench enabling the cargo area to be extended when seating just two. No details on pricing, but expect a fair premium over a Mule 3000/3100; prices for these models start at £6,450 for the 2WD petrol model and climb to £8,795 for the 4WD 3100 diesel.

Cargo load area capacity is an interesting issue. Manufacturers will typically list all up capacity and the total load for the cargo bed. The latter has to take into account two people on the machine. As an aside, the load

height of a utility vehicle can be around 1.0m from the ground, a notable exception being models like the £8,795 John Deere Trail Gator 6x4. This has a load sill height of just over 60cm.

A higher load 'sill' is fine when loading up light items, such as a few rakes and brushcutters, but hopeless for anything heavy. It is also worth noting that filling a cargo area with sand is possible, but when it comes to off loading, it may have to be done manually; only Club Car fit electric bed tipping as standard on certain models. Otherwise, it will need a trip to the options list for assisted tipping to be fitted. On models such as a Kawasaki Mule 3000/3100, this can cost a substantial £810.

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What is often overlooked is towing capacity. It can make a great deal of sense to buy a trailer, on suitable tyres and with a low load height, to compliment a vehicle which may be needed to move around pedestrian mowers and other kit too heavy to lift. Towing capacity can be pretty generous, with around 500kg all up being typical.

All the utility models currently on offer will have automatic CVT transmissions with the exception of the Kubota RTV900. This features a three range hydrostatic system. CVT transmissions are nothing new, and will include single and dual range versions according to make and model. For most courses, a single range should be fine, but a dual range can be handy when negotiating steep slopes.

CVT transmissions, which employ variable pulleys between the engine and transmission with a belt linking the two, typically do not offer engine braking. Back off the throttle, and the vehicle may not slow down, particularly down a steep incline. Polaris can fit downhill engine braking as an option to its Ranger, these petrol powered models being priced from £7,395. In contrast, the hydrostatic drive of the Kubota RTV900 has in-built self braking, the sealed inboard discs fitted to this model having less work to do as a result. RTV900 prices from £8,750.

Although the utility vehicles now on the market do, on the surface, seem to have a great deal in common, they are actually very different to both drive and in their off road ability. Take models like the 32hp £7,500 AUSA Task 50 and the 38hp £7,395 Polaris Ranger. Powered by 400 and 499cc single cylinder petrol engines respectively, these models have good ground clearance and 4WD. Where a 4x6 Gator will bottom out and get stuck in deep ruts, these units will sail on with little trouble.

Yamaha compete at both ends of the utility vehicle scale with its £7,599 petrol powered Rhino 660 and £5,000 G23 U-Max. The former is a head to head competitor with a vehicle like the Kawasaki Mule 600, but with considerably more power. The U-Max, which is also offered with electric power, is based around the Yamaha Golfcar and powered by a 357cc 11.4hp engine. It is classed as a light utility, but its roto moulded cargo box has a decent 363kg capacity with hydraulic assisted tilt available.



Latest Deere 'T' series Gators benefit from more power and better brakes; fuller details unavailable at the time of going to press. Note the use of a low loading trailer. This makes it far easier to load and transport heavy items of kit such as pedestrian greens mowers

A sharp intake of breath usually accompanies those asking the price of a top specification diesel Toro Workman. The pay off is built strong, a long service life and good residuals. New styling does not hide simple design

John Deere last year increased its Gator range to include models better able to tackle rough terrain. The light 10hp petrol powered CX compact is in Mule 600 territory and the 20hp diesel HPX High-Performance is Deere's competitor to the 24hp Kawasaki diesel Mule. Pricing is pretty similar too. Deere is also upgrading its existing 'traditional' models, these now boasting more power, improved braking and better performance. No further details were available at the time of writing.

Toro has a broad range of models in its Workman range, these models targeting the golf sector with a choice of electric, petrol or diesel power. Topping the range is the £21,152 Workman 4300 Diesel 4WD, powered by a 26.5hp engine. Payload for this and all 3200, 4200 and 4300 variants is put at 1134kg including two people at 91kg; in real terms rear load capacity is nudging a tonne on the heavy duty Workman range which is pretty useful. Even the lighter duty models have 748kg, which is impressive. This range includes the entry level 12hp petrol Workman 1100-D at £5,925.

Choosing the right machine for the job may be more complex now than it has been in the past, but stick to a few key requirements, and the number of units that fit the bill will start to shorten. There is no need, for example, to select a machine with good off road capability and 4WD for general course maintenance. Similarly, a vehicle with the capacity to carry fresh turf to the greens without risking damage at sensitive access points will call for the right combination of platform and tyre choice. Set the demands and the machine will more likely or not choose itself.



Kubota are alone in offering a sophisticated hydrostatic drive system on its recently introduced RTV900. Hydrostatics have a great deal to offer, and are well proven, the system offering the potential to potter along at a reduced engine speed. This is something a CVT automatic struggles to manage



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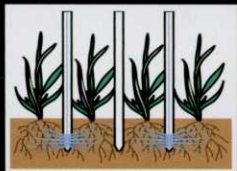


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