

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.

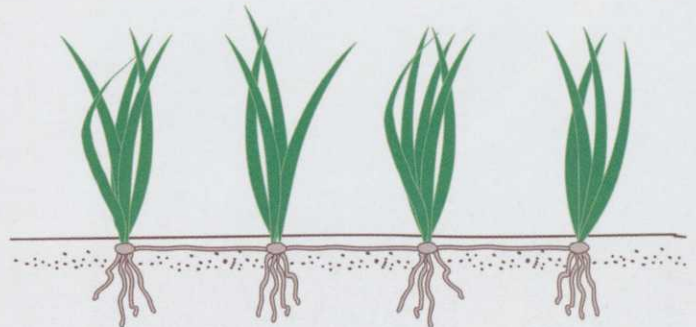
Soil Contamination: Another effect from significant oil exposure is the effect on the soil. Mineral oil is a known toxic material to living things. When sufficient oil is released into soil, the previously discussed plant effects occur. But, more importantly, the presence of mineral oil in the soil causes 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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