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Summary of findings of using TurfSolv® on turfgrass surfaces

I have had the opportunity to investigate the effects of TurfSolv® on turfgrass surfaces from September 2019. The following is a summary of uses on various turfgrass surfaces in the U.K.

1. Control of turfgrass pests

There are three major pests of turfgrass surfaces in the U.K, which are becoming a serious problem due to the complete withdrawal of permissions for insecticide use on turfgrass surfaces.

i. Leather Jackets

Leather Jacket is the common name for larvae of the European Cranefly (Tipula paludosa) (Fig. 1). They cause extensive damage by eating grass roots, which die from lack of nutrients and water (Figs 2 - 4).

Fig. 1 Cranefly larva (Leather Jacket)

Fig. 2 Leather Jacket damage to a cricket outfield

fairway

Fig. 4 Leather Jacket damage to a home lawn

Animals such as badgers, and birds such as crows, rooks and magpies, dig up the turf looking for these grubs and cause serious damage to turfgrass surfaces (Fig. 5).

Fig. 5 Damage to a cricket outfield from birds

We first tested the effect of TurfSolv® on Leather Jackets by spraying samples with 1:50 and 1:100 dilution rates. The 1:50 dilution had the best effects (Fig 6).

Fig. 6 Effects of 1:50 dilution TurfSolv®:water on Leather Jackets. Left pot – untreated larvae, all alive. Right pot – treated larvae, all dead. A video can be seen on request

Field trials to show the effects on Leather Jackets in soil was carried out by applying two treatments at 20 litres of TurfSolv® in 1000 litres of water (1:50) per hectare, with treatments three to five days apart (depending on access to the test sites and weather conditions).

Fig 7 shows the effects on larvae in a golf green, which seem to have 'melted'.
Fig 8 shows a larva in a home lawn that appeared from the test area less than two minutes after treatment and was dead ten minutes later. A subsequent second application on the test area three days later by a lawn contractor showed more than 80% control.

Fig. 7 Effects of 1:50 dilution TurfSolv®:water on Leather Jackets (circled) in a golf green.

Fig. 8 Leather Jacket appearance and death 10mins after TurfSolv® treatment on a home lawn

A bowling green contractor, Nigel White owner of Supergrass Ltd, trialled TurfSolv® on one of his greens. The day after treatment Nigel noticed the absence of birds pecking the green and recovery of the surface quality over the next three weeks. He put this down to the absence of Leather Jackets.

ii. Chafer Grubs

Chafer Grubs (Fig 9) are the larvae of the Chafer Beetle. There are six species in the UK, though the main problems on turfgrass surfaces are caused by just two species: The Garden Chafer and the Welsh Chafer, which cause similar damage as Leather Jackets, and also significant secondary damage from predators such as starlings, rooks, crows, jackdaws, magpies, foxes and badgers digging up the turf in search of this high protein feed lying just beneath the surface.

Fig. 9 Close up of different instars (stages of growth) of Chafer Grubs

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Fig. 10 Effects of 1:50 dilution TurfSolv®: water on Leather Jackets. Left pot – untreated larvae, all alive. Right pot – treated larvae, all dead. A video [illegible]n be seen on request

Fig. 11 Dead Chafer Grubs after 2 treatments, three days apart

Field trials to show the effects on Chafer Grubs in soil was carried out by applying two treatments at 20 litres of TurfSolv® in 1000 litres of water (1:50) per hectare, with treatments three to five days apart (depending on access to the test sites and weather conditions). Fig 11 shows the effects on larvae in a football pitch. We found that the larger the grub the less the effect, probably due either to the thicker outer skin/exoskeleton of the grub in more mature instars slowing down the penetration of the solution, and/or the larger the grub the more difficult to achieve full coverage and blockage of orifices. A higher volume of the solution may be necessary in some circumstances.

iii. Plant parasitic nematodes

There are numerous species of plant parasitic nematodes with fourteen species found to affect turfgrass plants in the U.K. (Figs 12–14).

Fig. 12 Sting nematode parasite of turfgrass plants

Fig. 13 Damage to football pitch from Rootknot nematodes

Fig. 14 Damage to a golf green by Rootknot nematodes

In Vitro testing was carried out by Dr Colin Fleming, on the effects of TurfSolv on nematode mortality. Dr. Fleming is the Principal Investigator at the Agri-Food and Biosciences Institute (AFBI) in Belfast, Northern Ireland, and has become one of the 'go-to' people for turfgrass nematodes. The other 'go-to' is Dr. Kate Entwistle of The Turfgrass Disease Centre.

Test methodology

A nematode mixture comprising @ 50% Meloidogyne naasi and 50% bacterial/fungal feeding species was exposed to 1:50 and 1:100 dilutions of TurfSolv®. For the control tests, nematodes were maintained in water. For each treatment, at least 200 worms were used, and mobility assessed visually 1 hour and 24 hours after exposure. Figures 15 and 16 show the % mobility in 4 replicated tests.

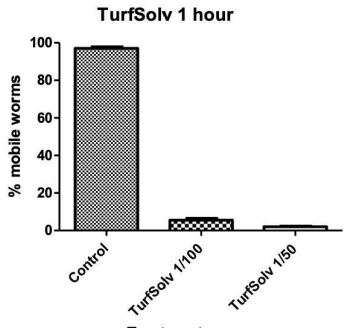

Figure 15: Mobility of nematodes 1 hour after exposure to TurfSolv.

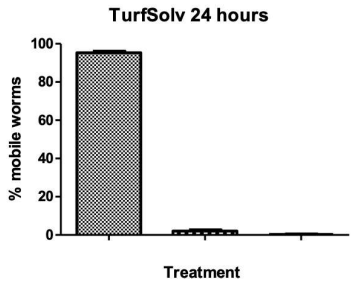

Figure 16: Mobility of nematodes 24 hours after exposure to TurfSolv.

TurfSolv® had a rapid effect on nematodes, with mobility of both free-living and parasitic species significantly reduced at the 2 concentrations. There was no difference in the effects of TurfSolv® on the 2 types.

Recovery experiment
To determine if the loss of mobility was reversible, immobile worms were transferred to water and checked after 24 and 48 hours for any mobility.
No recovery was observed.

Field trials are currently under way at an English Premier League and one Championship League football clubs. With sand dominated rootzones (>90% sand), high water and fertiliser inputs, the modern professional pitches provide the ideal environment for parasitic nematodes and is an ongoing problem with no proven treatment. TurfSolv® is looking promising and has surprised Dr Fleming in how effective it has been so far.

iv. Turfgrass diseases
The main turfgrass diseases in the UK are Fusarium Patch (Microdochium nivale), Red Thread (Laetisaria fuciformis), and Anthracnose (Colletotrichum graminicola). There is also increasing occurrence of Dollar Spot (Sclerotinia homoeocarpa) and Brown Patch (Rhizoctonia solani) due to the increasing average summer temperatures over the past few years.

The main focus of TurfSolv® trials has been on insect larvae, but we have recently instigated a disease trial at The Belfry, host of the Ryder Cup on four occasions. Two application rates have been applied:

- 10L TurfSolv® per hectare in 1000 litres of water
- 10L TurfSolv® per hectare in 500 litres of water

We are waiting on completion of the trial over the next few weeks, (a high disease pressure period) but the 10L TurfSolv® in 500L water looks promising in early applications.

2. Effects on plant health
TurfSolv® also contains plant biostimulants. These plant derived materials act as antioxidants by limiting the production of radical oxygen molecules when the plant is under stress, e.g. from heat. The amino acid content also helps the plant to repair tissue that is damaged from physical wear and environmental stress.


Fig. 17 Biostimulant effects of TurfSolv® on a golf tee in Spain


Fig. 18 Biostimulant effects of TurfSolv® on a golf green in Spain

Figures 17 and 18 show the biostimulant effects on turfgrass surfaces at Villa Padierna, Spain. Both surfaces were treated as trials for grubs, with air temperatures reaching over 40°C during the period of the 6 week trial. Both areas had suffered from heat stress before treatment, as can be seen from the brown patches of damaged turf, but the treated turf is greener and much healthier than the untreated areas.

More work is required to produce data on the effects of TurfSolv® on turfgrass stress, but we have seen only positive results so far.

3. Surfactant properties

TurfSolv® contains a sophisticated blend of surfactant technologies that play a major role in how the product works in and on plants. A demonstration of these properties is seen in Figs 19 & 20.

The rootzone profile of the rhizotron is USGA recommended rootzone overlying 6mm diameter gravel. 50ml of a 1:100 solution of TurfSolv® was poured onto the left side of the rhizotron and 50ml tap water was poured onto the right side. 50ml per day of tap water was applied to each side. Fig 12 shows the results after 12 days. The untreated rootzone shows a wetter surface profile than the untreated, and also algae growth.

Fig. 19 Surfactant effects of TurfSolv® on a USGA golf green profile. Right side – 50ml tap water. Left side – 50ml 1:100 TurfSolv®.

Fig. 20. Twelve days after treatment. 50ml of tap water was applied every day.

Conclusions

TurfSolv® is proving to be an effective treatment for insect larvae, fungal disease and biostimulant effects. More work is required on how TurfSolv® affects nutrition, e.g. mineral uptake, but I am confident this product will become a 'must have' treatment for U.K. turfgrass managers.

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