



Horticultural
Development
Company

Grower summary

HNS 176

Novel methods of algal control
in aquatic plant production
tanks

Final Report 2010

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Before using all pesticides check the approval status and conditions of use.

Read the label before use: use pesticides safely.

Further information

If you would like a copy of the full report, please email the HDC office (hdc@hdc.org.uk), quoting your HDC number, alternatively contact the HDC at the address below.

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Headline

'Cloverleaf Blanket Answer' was the only product tested that controlled blanketweed.

Background and expected deliverables

Algal contamination of aquatic plants, in particular with blanketweed, is a major issue on nurseries, most growers wash plants in water and hand-remove visible contamination. However, small amounts of algae can remain and multiply rapidly up during display for sale and cause customer rejection of the plants. Aquatic plants grown in production tanks are sold for aquaria, ponds, swimming ponds, lakes and for biological filtration. Growers can also be held responsible for supplying plants that introduce algae to previously clear water.

The move to conserve water and use rainwater and run-off water, rather than only mains or bore-hole supplies, is likely to lead to algae in water supplied to plants. Algae threads can block filters, while fragments and unicellular algae may pass into aquatic plant trays and tanks. Algae may also increase on pots grown out of water. Algal growth in drainage channels and on pots encourages shore flies which can lead to plant rejection by purchasers; additionally, shore flies transmit fungi such as *Pythium* species.

The herbicide 'Clarosan 1FG' (terbutryn) had its approval revoked in 2007, this product had been used successfully to control filamentous algae and floating weeds without (usually) affecting water lilies. Biocidal products available for algal control in water in the UK are mainly marketed for amateur use, with registration previously under the Health and Safety Executive (now part of the Chemical Regulation Directorate, CRD). Algaecides do not carry claims to protect pond plants, and so do not fall under the remit of the Pesticides Safety Directorate (now part of CRD). These products can thus be used professionally, but an assessment of any health risks needs to be undertaken by users based on the larger volumes likely to be used. The product registration does not consider plant safety and so if used commercially they would also require phytotoxicity tests before widespread use.

Published information is lacking on the efficacy of most of the microbial, enzyme or natural chemical products marketed for algal control. There is information on the use of barley straw and its extracts (published in HNS 145). The Royal Botanic Gardens at Kew have used the dye Dyo-Fix Blue successfully in their water lily ponds, reducing the light penetration to stop

photosynthesis by the algae below the water surface.

An EU project has shown the effectiveness of ultrasound in a chemical-free treatment system for fish farms, suppressing algal growth and causing efficient sedimentation of planktonic algae using an LG Sonic device. LG Sonic devices are claimed to help in controlling algal growth, with a difference visible from 24 hours to two weeks after use. (It might be feasible to justify the capital cost of such an ultrasound device if, after a two week treatment period, it was moved sequentially between blanketweed contaminated tanks).

The Centre for Aquatic Plant Management investigated the mode of action of ultrasound on algae, including a blanketweed, *Spirogyra*. Within 14 days there was disruption to the cell contents and walls. The cells remained buoyant for a few weeks, but were not viable. Some treatments, in particular ultrasound, have been reported to also control fungi, bacteria and biofilms (bacteria and slime). Pathogen control would be an additional benefit from the use of such algal control products.

It is not known if there may be any phytotoxic effect to aquatic plants from the various algal control methods. Although some products and procedures state that they are safe to aquatic plants, observations may have been carried out in ponds where any loss of plant quality may be better tolerated, and where conditions differ from denser packed production tanks.

The specific objectives of the project were:

- To determine the efficacy of some existing UK-marketed microbial and natural aquatic-algae control products.
- To test the concept that ultrasound will control algae in nursery aquatic plant production tanks.
- To check for phytotoxicity to aquatic plant of some algal control treatments.

Summary of the project and main conclusions

Algal control by products added to the water

A list of algal control products available in the UK was compiled. Five powder or liquid products were selected which had varying claimed modes of activity (Table 1). Testing was carried out in summer 2009 at ADAS Boxworth with 50 L tanks (four per treatment) in which filamentous algae (blanketweed), unicellular green algae and Bog Arums obtained from an aquatic plant nursery were introduced. The products were added to the water according to their labels (Table 1). Records of blanketweed water coverage, unicellular algal density, water properties and plant growth were taken fortnightly for eight weeks.

Table 1: Treatments, ingredients and handling precautions, addition rates and frequency of addition for products to 50 L tanks of algae and plants over eight weeks

Product	Ingredients and handling precautions	Dose used (as label)	Application intervals
Untreated	-	-	-
Interpet Blanket weed Buster with Sludge Buster	Probiotic bacteria. No handling precautions.	One spoonful (6.6 g) / 1325 L, mixed first in 1 L warm water.	Repeat every 2 weeks.
TetraPond AlgoFin for blanketweed	Monolinuron 0.75 g / 100 ml. Wash hands after use. May produce an allergic reaction.	50 ml / 1000 L.	Repeat at half-dose every 4-6 weeks.
NT Aquaclear Algae and Blanketweed control	Non-toxic blue dye. Avoid staining clothing.	10 ml / 586 L.	Repeat monthly as the colour fades.
Nishikoi Blanc-Kit Excel	Natural minerals and botanical compounds. Wash hands after use.	5 ml scoop (5.2 g) / 318 L.	Every 2 weeks for 6 weeks, then monthly.
Cloverleaf Blanket Answer	Minerals and enzymes. Wash hands after use.	Level 30 ml scoop / 285 L.	Repeat if required (repeated Day 28).

Outstanding control was shown by the Cloverleaf Blanket Answer with no blanketweed (dead or alive) present after 28 days in any of the four treated tanks. Control was maintained until the end of the experiment (57 days after treatment). After 14 days, the blanketweed broke apart when handled and would have been easy to clean off the plants. In contrast, blanketweed coverage reached 100% in three out of four untreated tanks over the duration of the experiment. The product powder needs to be mixed with water taken from the tank and then the water sprinkled over the tank surface. The water becomes slightly milky. The

product has a retail price of £7.78 for a single treatment of 10,000 L. This was the only product of those tested where a single dose was sufficient to give complete algal control. The product is marketed for fish ponds and so there would not be expected to be concerns about selling plants directly from treated tanks.

There was unexplained variation in the blanketweed cover between tanks receiving the same treatments, such as from the fortnightly doses of the Blanc-Kit Excel, where one of the four tanks had no algae at the finish, while the other three had over 50% cover. Some of the other products such as Aquaclear Algae and Blanketweed control (containing a blue dye to exclude light from the algae) showed promise in two tanks, but possibly could not work against blanketweed floating at the water surface. The AlgoFin herbicide started to give some control, with disintegrated algal strands seen under the microscope after 14 days. However, surviving strands multiplied, and topping up with more AlgoFin after four weeks with the recommended half dose was ineffective. Some blanketweed with broken cells were seen 14 days after treatment with Interpet Blanketweed Buster (containing bacteria), but after eight weeks of fortnightly re-application the blanketweed volume had not been reduced.

All the products were stated to be safe with pond plants. There was no phytotoxicity to Bog Arums in the first weeks of the experiment. The condition of the plants then deteriorated in all the untreated and treated tanks over the eight weeks and so it was not possible to assess phytotoxicity. Growers would be advised to test samples of various aquatic plants in a tank with their selected product before wider use. No treatment effects were detected on unicellular algae (low densities occurred throughout), or on either the pH or EC of the water.

Algal control using an ultrasound device

An LG Sonic SSS 220 ultrasound device was tested against blanketweed in a series of 400 L Bog Arum production tanks on a nursery near Hitchin, Herts. To determine whether one ultrasound device could treat several tanks, the device was moved between four tanks in turn at fortnightly intervals, one tank remained untreated throughout. According to the manufacturer, the device was expected to show effects within two weeks of treatment. Monitoring of algal density, water properties and plant vigour was carried out between 3 June and 12 August 2009. No treatment effects were detected on unicellular algae, with low densities being recorded throughout, or on either the pH or EC of the water.

Blanketweed was disrupted by the ultrasound device leaving brown, broken filaments in three of the four tanks. However, after the treatment period the blanketweed disruption was confined to within 0.3 m of the device. Beyond this distance the floating plants with hanging

roots may have impeded the ultrasound waves. The percentage water surface area coverage by blanketweed in two tanks was lower by the end of the experiment, but healthy green blanketweed was still present in all four treated tanks by the end of the experiment. Bog Arum shoot and root growth and appearance were unaffected by the device. It would not be possible to gain effective treatment in plant production tanks with a 14 day treatment; possibly a more extended treatment would be more effective. Only one ultrasound model was tested, and results might differ with a different manufacturer's product range.

Financial benefit

There are only a few large growers of aquatic plants remaining in the UK, but there are a larger number of smaller ones. Generally businesses have a very diverse customer base including landscape garden companies, garden centres, aquarium, koi specialist suppliers and mail order direct to the public. This makes placing a financial figure on the market very difficult.

Plants growing in pots of soil or compost have to be hosed off and individually manually cleaned before being dispatched (it is not easy to remove all the blanketweed fragments and these can regenerate). Nurseries often differ in the frequency of cleaning of aquatic plant tanks (depending upon the level of contamination and the market the plants are destined for), and some tanks will remain with unsold stock between years which will mean that blanketweed is present to multiply up the following spring.

Therefore, the use of Cloverleaf Blanket Answer to disintegrate blanketweed would mean that plants would not be tangled with weed, be easier to pick out and require much less cleaning time, and tanks might not need to be cleaned out as frequently between crops to remove the blanketweed.

Action points for growers

- Ensure that tanks are treated for blanketweed early in the plant production cycle – not forgetting mother plant tanks.
- Treat blanketweed as soon as any is seen, before it builds up.
- Consider adding Cloverleaf Blanket Answer to tanks to control blanketweed, using manufacturer's recommended rates.
- Check phytotoxicity to Cloverleaf Blanket Answer using a sample range of different plant species before application to whole production areas.

- If testing ultrasound treatment for the control of blanketweed, use it before increasing plant pot density in tanks, and remove any obvious blanketweed before commencing.