



ORNAMENTAL AQUATIC TRADE ASSOCIATION LTD

*"The voice of the ornamental fish industry"*

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## OATA guidance on Marimo (*Cladophora*) moss balls and Zebra mussels



### Introduction

There have been recent incidences reported in countries such as the USA, Sweden, and the UK where the invasive non-native species, Zebra mussel (*Dreissena polymorpha*) has been found within Marimo (*Cladophora*) moss balls. Although such moss balls are sold for use in aquariums, we are aware that they are also being sold by artisanal sellers for use in terrariums or as decorative features e.g., jewellery.

This information leaflet aims to provide guidance in relation to such moss balls, how to identify Zebra mussels, what measures should be taken if you find them and precautionary decontamination procedures to minimise any risk of such mussels entering our natural watercourses and harming our native habitats and species. Although these occurrences have been infrequent, suppliers, retailers and hobbyists must be vigilant to this potential threat.

Marimo (*Cladophora*) moss balls

Despite their name, these moss balls are not actually moss but are formed from a freshwater algae species, *Aegagropila linnaei* and are popular in aquariums due to their ball shape, being used to add interest or to provide enrichment for fish species such as bettas. This alga occurs in the wild, where its distribution is restricted to certain parts of Europe such as Ukraine, and countries such as Japan and North America. Whilst this algae species is banned in certain countries, such as Norway, it should be noted that Marimo (*Cladophora*) moss balls are not banned in the UK. However, suppliers and retailers should be aware that such moss balls which are sold as 'plants for planting' i.e., for use in aquariums and terrariums, will fall within scope of the UK plant passporting requirements (as does *Caulerpa* and *Chaeto* macro algae). Further guidance on the UK plant passporting requirements is available via the

Gov.UK Plant Health Portal available at: <https://planthealthportal.defra.gov.uk/eu-exit-guidance/>

### **Zebra mussel (*Dreissena polymorpha*)**



*Photo source: GB Non-Native Species Secretariat*

Zebra mussels are small molluscs (typically about 20mm long) which are native to basins of the Aural, Black and Caspian Seas. In appearance, they are a brownish-yellow colour and take their common name from the appearance of characteristic 'Zebra' stripes. During their lifecycle, they have three life stages: larval, juvenile, and adult. In their larval stage, they are easily transported in the water column and are able to drift for large distances (up to 300 km). Adult Zebra mussels can attach themselves to boats, aquarium plants and fishing equipment and can survive out of the water for up to three weeks under damp conditions. They can produce up to one million eggs per season and being filter feeders, can potentially filter over one litre of water per day.

#### ***Why are Zebra mussels considered harmful?***

Zebra mussels are an invasive non-native species due to the harm which they cause to our native habitats and species. They can cause severe alterations in the habitat allowing other invasive non-native species to establish and threaten our native mussel species by reducing available habitat, oxygen, and food. In addition, they are a major pest in water treatment works by clogging pipelines, cause damage to boats and can cause injuries to people in recreational areas due to their sharp shells. In addition, they also cause economic harm due to the considerable expense in removing them.

#### ***Sources of contamination***

Ukraine has recently been identified as a source of Marimo moss balls contaminated with Zebra mussels. We would encourage members to avoid stocking moss balls direct from Ukraine or from unverified suppliers where you cannot determine the source. If unsure, avoid stocking moss balls until your supplier confirms a lack of zebra mussels in their stock.

#### ***What should I do if I find a Zebra mussel within a Marimo moss ball?***

You should report this to the GB Non-Native Species Secretariat via email to: [alertnonnative@ceh.ac.uk](mailto:alertnonnative@ceh.ac.uk) and if possible, include a photo. Please also provide details of where you purchased the moss ball from and any additional details e.g., details from the plant passport. You should also follow the decontamination procedures as below (and as reproduced by kind permission of the Pet Industry Joint Advisory Council, USA).

#### **Decontamination procedures**

The procedures given below have been referenced from guidance issued by the Pet Industry Joint Advisory Council, USA and therefore US measurements have been approximated to their UK equivalent.

### ***Disposal of moss balls***

Once the moss ball has been removed from the aquarium/terrarium, use one of the following methods given below prior to disposal:

- Place the moss ball into a sealable plastic bag and freeze for at least 24 hours OR;
- Place the moss ball into boiling water for a least one full minute OR;
- Submerge the moss ball into a solution consisting of approx. 250ml household bleach per four litres of water OR;
- Submerge the moss ball in undiluted white vinegar for 20 minutes.

Once you have undertaken one of the methods listed above, place the moss ball and any of its packaging into a sealed plastic bag. This can then be disposed of in the household domestic waste.

If you have used a method involving vinegar, boiling water or a household bleach solution, this liquid should be disposed of via the foul sewer. Under NO circumstances should it be disposed of down a storm drain, where it risks entering natural watercourses.

### ***Additional advice to aquarium users – decontamination of aquarium water***

If the moss balls have been used in your aquarium, these additional decontamination steps are recommended to decontaminate the aquarium water ahead of disposal. Please note that any such water should be disposed of via the foul sewer ONLY and must NOT be disposed of via a storm drain.

- Prior to the decontamination process, set up a separate holding tank in which to place your fish, invertebrates, other living organisms etc. The holding tank should use water from a source which has not been in contact with moss balls. Make sure the water in the holding tank matches the conditions in your aquarium e.g., water temperature, pH and that any tap water used has been treated to remove chemicals such as chlorine and chloramine which are highly toxic to fish. To help minimise stress you may wish to keep the holding tank in a low light area and separate out any aggressive fish.
- Potassium chloride (KCL) is known to be toxic to Zebra mussels, therefore, to decontaminate the water in your aquarium which have had moss balls, it is recommended to use KCL – this is typically sold for use with aquarium plants and can be obtained from a reputable retailer.
- You need to achieve a KCL concentration in the water of 200 parts per million (ppm). Start by adding  $\frac{3}{4}$  teaspoon or 8g of KCL per 40 litres of water. Over the next three days, this concentration should be increased by adding  $\frac{1}{4}$  or 3g teaspoon of KCL per 40 litres of water per day. Once this is complete, leave the aquarium water for 96 hours.
- After 96 hours, carry out a series of water changes over the next several days to dilute the concentration of KCL (remembering to dispose to the foul sewer ONLY). It is recommended to change all of the filter media and to add a proprietary filter bacteria supplement in order to replace any beneficial filter bacteria that have been removed in the decontamination process.

Your aquarium and any accessories in the aquarium should then be cleaned using one of the methods below:

- Boiling water – use water that is at least 60 degrees Celsius to flush and coat all accessory surfaces OR;
- Disinfection – make a solution of approx. 85 ml of household bleach per four litres of water and use this solution to soak any rocks or décor for 15 minutes. Ensure to rinse and dry thoroughly before re-establishing your aquarium.
- Once the decontamination process has been completed and your aquarium re-established, it is recommended to carry out water quality checks within a week and to be vigilant for anything in your aquarium that looks unusual or is unexpected.
- The above process can also be used to decontaminate terrariums.

#### *Additional guidance to retailers*

To help the UK stay vigilant to the threat of Zebra mussels in Marimo moss balls, please consider putting in methods to test and treat moss balls prior to their sale and to reassure your customers. Ensure that your supplier is doing the same.

In addition to the disposal and decontamination methods described above, these additional measures should be considered if you have an *inline plant aquatic holding system*.

- Register block for fish and invertebrates.
- Fish and invertebrate replenishment should be deactivated.
- The holding system should be converted to a closed system i.e., the water is circulated but automatic water changes are deactivated to avoid the draining of potentially contaminated water down the drain).
- Water quality should be monitored.
- If nitrate levels increase, manual water changes should be undertaken but wastewater should be treated with household bleach prior to its disposal.
- Move fish and invertebrates out of the main system into a separate isolation tank.
- The decontamination process using Potassium Chloride (KCL) as described above should be undertaken but ensure you have the necessary risk assessment and safety procedures in place for storing, handling and use of KCL.
- Once the decontamination process is complete, replace all filter media, undertake normal system maintenance and revert to an open system.
- Make inventory adjustments.
- Remove the register block.
- Reactivate replenishment.

#### *For standalone, free-standing plant tanks*

- Follow the disposal methods as given above.
- Move any fish or invertebrates out of the main system into a separate isolation tank
- Follow the KCL decontamination process as above.
- Once complete, change all filter media, adding proprietary filter bacteria supplements to replace beneficial bacteria removed during the process.
- Closely monitor and test water quality and monitor the tank closely following this process.

### ***Additional guidance to suppliers***

If you use tanks to consolidate moss balls, the system should be cleaned in accordance with the guidance as provided above for retailers.

### ***Additional guidance for water gardens***

To eradicate zebra mussels from water gardens, follow the KCL decontamination procedure as detailed above. Any submerged accessories should be cleaned using the cleaning methods above i.e., boiling water or disinfection. Remember to rinse and dry all items thoroughly prior to replacing in the water garden and that any wastewater MUST be disposed of via the foul sewer and NOT the storm drain.

### **Acknowledgements**

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