

## **Malachite green (use – risk – regulation - banning)**

### **Introduction**

Malachite green (MG) is an organic compound “triphenylmethane” that is traditionally used as an industrial dye for materials such as silk, wool, cotton, jute, leather, and paper. Being an organic compound, Malachite green is not related to the malachite mineral; the similarity of the green color has been the reason for the name.

Malachite green has been found effective as an antifungal agent in fisheries and has been used as an effective fungicide, especially as a general fish hatchery disinfectant. However, the use of malachite green has been banned for health concern in many countries according to the recommendations of national and/or international related agencies.

### **Use in aquaculture**

Malachite Green has been used as a fungicide in aquaculture since 1936. Its use has been very popular in treating fungus, antibacterial (gram positive bacteria) and ectoparasites especially in the treatment of eggs in fish hatcheries. Dosage rates of (MG) vary depending on treated species, stage of development (eggs, larvae, larger fish), and the holding system (aquariums, tanks, open system, closed system). The treatment dose will be influenced by the method of application whether infinitive or bath treatment.

Malachite green has been widely used in aquariums. In order to give an idea about treatment doses on fish or shrimp, rates that range from 0.05 – 0.2 mg/l as active ingredient have been used. In some dip treatment for fish eggs, a dose of 5 mg/l for 10 minutes has been applied.

### **Risks and Precautions**

Based on research findings, malachite green caused carcinogenic symptoms after doing an experiment on a lab rat. Also and regardless to the inconsistent/variable results, malachite green showed toxicity to many of fish species –even when used at recommended doses- under different environmental conditions especially water pH and temperature.

Malachite Green absorbed by fish tissue is metabolically reduced to leucomalachite green (LMG), which can be stored in fish tissues especially in the liver of exposed fish for an extended period of time as affected by the slow clearance of the drug metabolites. Scientific evidence indicates that (LMG) may be a genotoxic carcinogen which persists in fish tissues long after malachite green can no longer be detected.

Due to the suspected mutagenicity of Malachite Green and (LMG), its use in aquaculture has been monitored or banned in many countries worldwide. However, the use of malachite green could be in practice here and there for variety of reasons.

### **Regulations related to malachite green (in aquaculture and trade)**

The actions taken by various national or international systems in relation to the use of malachite green on fish vary as follows:

- Due to its low manufacturing cost, malachite green is still in use whereas less restrictive laws are common
- The approval is granted to the use of malachite green on aquarium fish but not on food fish
- If the use of malachite green is approved, the compound is zinc-free fisheries grade to avoid heavy metal toxicity

- Banning the use of malachite green during the entire lifecycle of target fish, from the hatchery to the farm
- Blocking the importation of fish products contaminated with malachite green
- Banning the use of domestic or imported fish for human consumption if contains MG/LMG above 1ppb
- Classifying MG as a Class II Health Hazard
- Establishing laboratories with equipment to enable detecting the sum of MG and LMG residues at as low as 1 ng/g
- Establishing surveillance programs along with notification system as the one developed by the EU Rapid Alert System for Food and Feed (RASFF) regarding the illegal use of MG or trade of contaminated fish

**References:** Encyclopedia Britannica, Food and Drug Administration (FDA), Wikipedia, NCBI