**Fish and Sunlight Factsheet: The importance of using shade cloth on fish tanks**

**What is a shade cloth?**

* ****A shade cloth is knitted fabric that is used to provide shade outdoors without fully excluding sunlight. Shade cloths come in a variety of densities to block out different percentages of sunlight.
  + Example:
    - 30% shade cloth blocks out 30% of sunlight.
    - 70% shade cloth blocks out 70% of sunlight.
* The shade cloth is made of UV-resistant plastic which increases its lifespan due to the fact that UV light can degrade the plastic.

**Why do we use shade cloths on the fish tanks?**

1. No part of an aquaponics system should have exposure to direct sunlight because the light will stimulate the growth of **algae**. The algae become a nuisance in many ways. The algae will uptake the nutrients meant for the valuable terrestrial plant crops. The algae will also coat the roots of the plants and clog pipes, screens, and other system components.

Algae can also have negative effects on water quality. High algae concentrations may lead to low dissolved oxygen concentrations because algae respires at night, consuming oxygen. There are particular algae species with the ability to eradicate CO2 from bicarbonate ion: HCO3-http://www.krisweb.com/krissheepscot/krisdb/html/krisweb/stream/arrow.gifCO2 + OH – resulting in an increased hydroxyl (OH -) concentration that is linked to an increase in pH (pH becomes more basic) (Deas and Orlob 1999). Increases in pH accompanied by raised water temperature may create an intense change in unionized ammonia concentrations in aquatic systems (Deas and Orlob 1999).

1. The shade cloth reduces the **water temperature** in the system. Reduction in temperature of water lowers evaporation rate of water in the system.
2. The shade cloth prevents sun damage to the fish. Fish prefer **subdued light**, especially in the clear water of aquaponic systems. Fish move to cooler, deeper water on hot sunny days to stay comfortable in natural environments. Our shallow Aquapono mini systems don’t allow the fish to do this so we must supply them with a cooler, more shaded environment.
3. Shade cloth also provides **protection** against predators.

**How do I select the proper shade cloth density?**

50/50 (50%) shade cloth is recommended for the Aquapono mini systems. The University of the Virgin Islands, a commercial scale aquaponic system, recommends 100% over the fish tanks. They also cover their clarifiers and filter tanks to eliminate potential algae growth at multiple points. Only the troughs are exposed to light so that the crop plants are able to photosynthesize. In commercial systems algae can become a huge problem that will greatly affect production. Therefore elimination of sunlight greatly reduces risk of algal blooms.

**References**

[Deas, M.L. and G.T. Orlob. 1999](http://www.krisweb.com/krissheepscot/krisdb/html/krisweb/biblio/klamath_ucd_deasorlab_1999_wq.pdf). Klamath River Modeling Project. Project #96-HP-01. Assessment of Alternatives for Flow and Water Quality Control in the Klamath River below Iron Gate Dam. University of California Davis Center for Environmental and Water Resources Engineering. Report No. 99-04. Report 236 pp.

Personal Communication with R. Charlie Shultz (Past Researcher at University of the Virgin Islands)).