Contamination Identification for Spools


Image 1


Image 2


Image 3


Image 4


Image 5

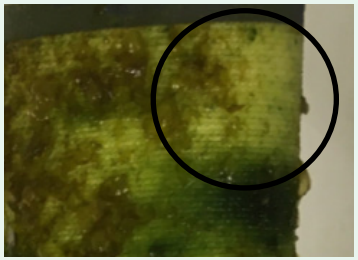
Image 6


Image 7

Bacteria

Bacteria show up on spools in many different ways. Sometimes an outbreak in bacterial contamination is due to inadequate water supply, but other times the outbreak happens as a result of the bacteria present in the gametophyte cultures. Typically, bacterial contamination is manageable.

The most common bacteria that we see (images 1 and 2) is a yellow bacteria that appears on spools near high flow areas. In our tanks, we see this near the inflow, the outflow, and around the pump intake. Under the microscope, the bacteria appears stringy (image 3). Sporophytes are usually able to outgrow this type of bacterial contamination without any problem, however if a thick film appears, it may cause an issue.

Some bacterial outbreaks (images 4 and 5) can pose a threat to the health of your spools by completely smothering the developing sporophytes. In this case, the bacterial slime was so thick that it could be pulloff in slimy sheets. Unfortunately, when the slime is pulled off, many sporophytes come off with it. In addition to sporophyte loss, a contamination like this also takes significant time to mitigate.

Cyanobacteria are a subset of gram-negative bacteria that use photosynthesis. They are usually colored, relating to their ability to photosynthesize. The most common cyanobacteria we see is green (image 6). It appears as a thin coat of green that is over the entire spool, not usually patches. Another type of cyanobacteria is pink (image 7). Typically the pink cyanobacteria appears in patches on the spool.

Image 8

Image 9

Microalgae

Many of the contaminates that appear in gametophyte cultures are microalgae. Microalgae are single-celled organisms, although they often exist in chains or groups. Single cells are not big enough to be visible by eye, but groups of them are. Most microalgae we find on spools are blue/green.

Green microalgae grows in chains that look stringy or webby at a macroscopic scale (image 8). If left unchecked, the algae will grow quickly and attach to the spools (image 9), eventually smothering the gametophytes and sporophytes. There is no chemical treatment for the contamination, but small strands can be scooped out as they appear to avoid extra growth.

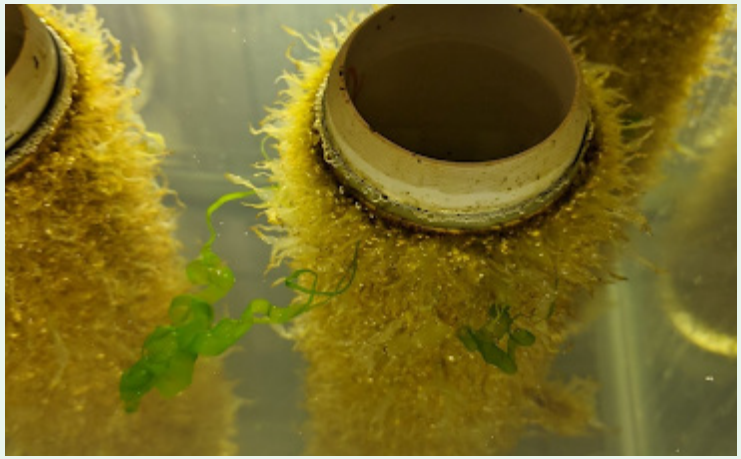

Image 10

Other Macroalgae

Occasionally, other macroalgal species make their way into tanks. This is more common when spore seeding than when gametophyte seeding. The most common macroalgal contamination is ulva (image 10). Macroalgae contamination can be remedied easily, if caught early, by removing the blades with sterile tweezers.

Image 11

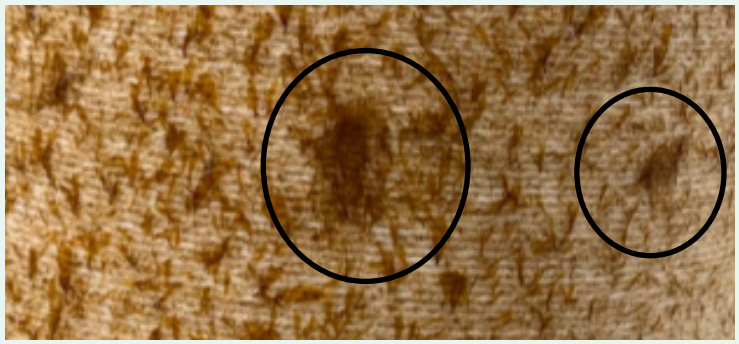

Image 12

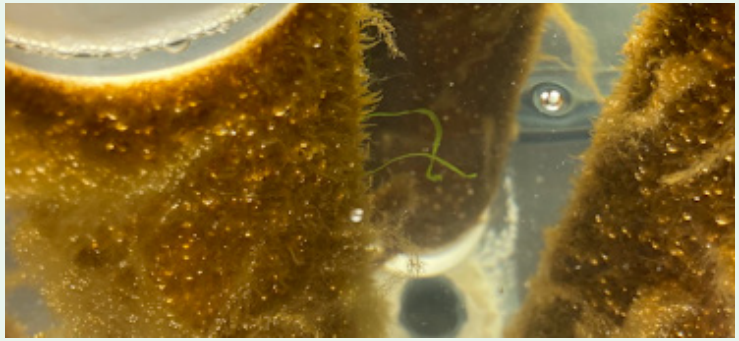

Image 13

Ectocarpus

Ectocarpus is a filamentous brown alga. It looks similar to kelp when growing on a spool. When the ectocarpus is outgrown the differences are visible.

You can distinguish between kelp and ectocarpus under the microscope in three main ways:

1. Cell fill - Under the microscope, ectocarpus cells look “emptier” than kelp (image 11).
2. Color - Under the microscope, ectocarpus is a lighter color than healthy kelp gametophytes (image 11).
3. Morphology - Both kelp gametophytes and ectocarpus branch in similar ways, but ectocarpus has more long single shoots that branch out from the main shoot (image 11) and appears stringy (image 13).

Since kelp and ectocarpus are both brown alga, it is not possible to kill the ectocarpus without damaging the kelp. Instead, you can treat low level ectocarpus contamination with manual measures. For spools that look like image 12, you can use tweezers to gently pull the clumps of ectocarpus from the string. Spools that look like image 13 are not treatable because there are so many new tufts of ectocarpus forming. If your spools have developed sporophytes already, the sporophytes may still be able to outcompete the ectocarpus.

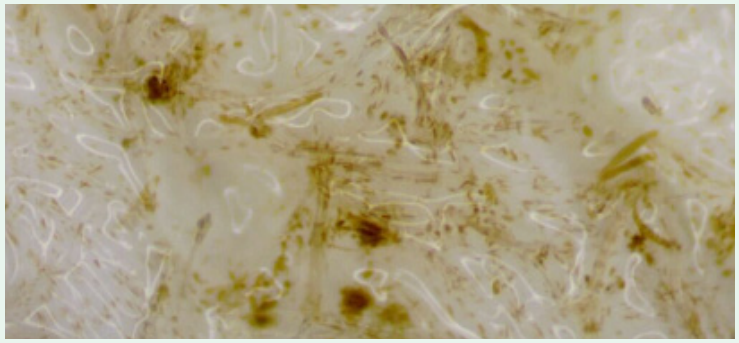

Image 14

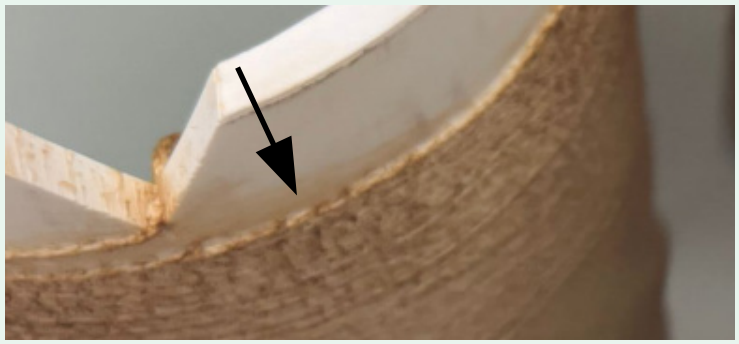

Image 15

Image 16

Diatoms

Diatoms are a type of protist; we list them separately because they are treated in a different way than other protists. Diatoms appear in cultures in a few different morphologies and have cell walls made of silica. Diatoms are a threat to cultures because they graze on gametophytes and they grow much faster than the gametophytes and can smother them.

When diatoms appear in a tank, they can take off very quickly. Monitor your spools closely to avoid a major outbreak. Because diatoms are photosynthetic, you will see signs of contamination closest to the light source first. If left unchecked, the diatoms will smother the sporophytes (image 14). Initial signs of diatom contamination are small brown spots on the walls of the tank or surface and edges of the spools (images 15 and 16).

Because of the unique cell wall structure of diatoms, there is a chemical way to treat them. Dosing a culture with germanium dioxide prevents new growth. It is important to treat diatoms early because the GeO2 treatment does not kill already existing diatoms, but instead prevents new growth.