e-GRO Alert

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The green you do not want in the greenhouse: Algae

Algae is one of the most common problems in greenhouses. Algae is present in facilities producing ornamentals, vegetables, or cannabis. It grows even in the tightest production systems like indoor farming. Algae grows in organic surfaces (e.g. peat or bark substrates, foliage), hard surfaces (e.g. concrete floors or tanks, expanded metal, emitters (Fig. 1) pots), inorganic substrates (e.g. rockwool, cooling pads), and solutions (e.g. water sources, nutrient solutions).

Algae is a true nuisance in controlled environment agriculture. Unlike other pests, diseases, and weeds in the greenhouse, algae is one of those problems that is rarely studied—perhaps because the economic injury level on crops is low (or so we believe, because it has not been measured). Algae can also be a worker hazard when it accumulates on walking areas.

In this article, I review the common algaecides that are available for use in greenhouses, share what is known about their efficacy, and provide general recommendations on how to use them safely.

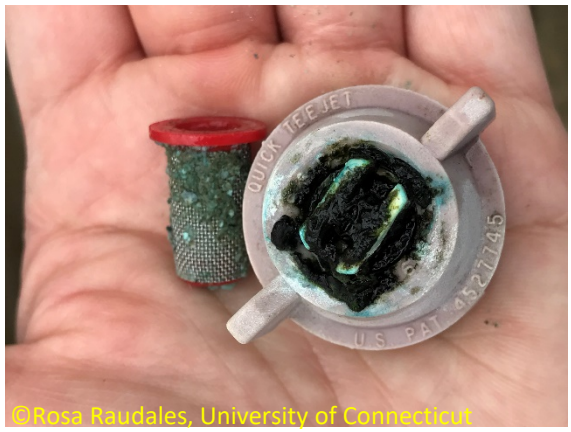

Figure 1. Emitter from an irrigation boom covered with algae.

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The biology of algae

Algae is ubiquitous. We do not know exactly where algae comes. We know that if the conditions are conducive for it to grow, it will grow.

Algae grows well when there are high nutrient loads, low disturbance or vertical mixing, and warm water temperatures (77-95˚F). Algae are photosynthetic organisms—light is another factor that promotes algae growth. Do these conditions sound familiar? These are the same conditions in which we grow plants.

Algae adapts well to wide range of nutrient levels. When nitrogen level is low, nitrogen-fixing algae fix nitrogen gas from the atmosphere. That might explain why sometimes we see algae in surfaces where there is "only" water.

Algae does not need depth of water to thrive. It grows best on the upper surface of water bodies (e.g. ponds or tanks) and thin films of moisture on surfaces (Figure 2). I have also noticed that algae grows abundantly on the inside surfaces of water storage tanks—not so much in the vertical layer of water.

Most algae has flagella which makes them very efficient to move in films of water. Keep this in mind, any time water moves in the greenhouse, it likely carries algae spores.

In short, algae is a very efficient little thing that grows well in the environmental conditions that we provide in the greenhouse.

Control methods & efficacy

As with plant diseases, prevent algae by managing the environment and reducing the inoculum.

The environmental conditions that we can control include:

1. Prevent light transmission, when possible. For example, avoid clear plastics in irrigation systems (Figure 3) and use storage tanks with opaque colors.
2. Avoid excessive free moisture on surfaces (Figure 4). Be mindful that areas like propagation houses or the edges close to the plants remain wet for prolonged periods. Try to brush these areas more frequently.

Figure 2. Algae on the walls of a propagation house in a wholesale greenhouse. Algae does not require high levels of moisture to grow well on a surface. A thin film of moisture, as in a vertical wall in this propagation house, is enough for algae to grow.

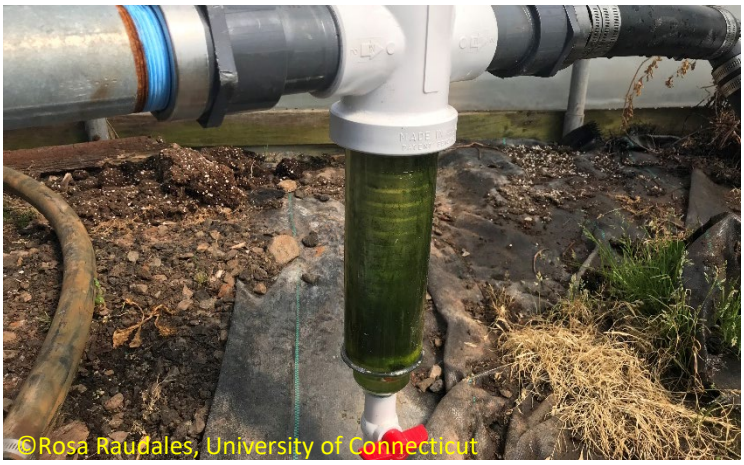

Figure 3. Algae buildup inside the cartridge filter housing. This clear material allows light transmission, the filters remains wet, and salts and organic accumulate in the filter—providing a perfect environment for algae to flourish.

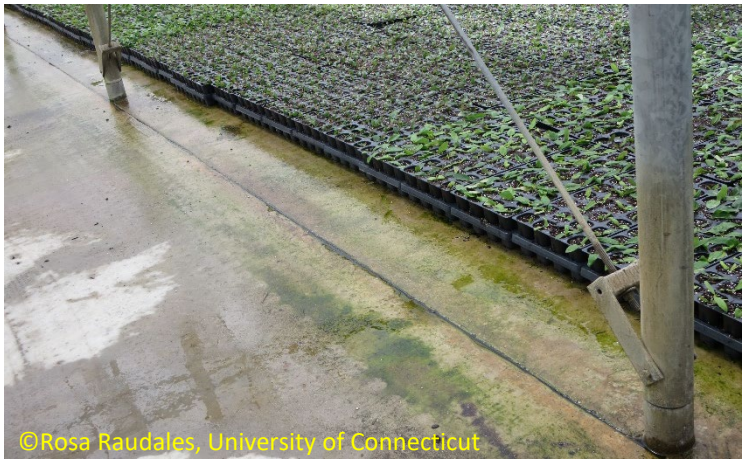

Figure 4. Free water in aisles next to propagation trays. Identify areas that are prone to remain wet and brush them more often.

Reduce the inoculum mechanically or by applying algaecides.

Physical methods include brushing the surfaces or pressure washing (Figure 5).

Chemical methods include products that can be used in irrigations systems, water sources, or surfaces. The active ingredients approved for algae control are the same regardless of the application. However, the rate of application may vary depending on plant safety.

The active ingredients include chlorine, chlorine dioxide, hydrogen dioxide, hydrogen dioxide + peroxyacetic acid, hydrogen peroxide + peroxyacetic acid + octanoic acid, quaternary ammonium, and sodium carbonate peroxyhydrate. Find more information refer to the New England Greenhouse Floriculture Guide (http://negfg.uconn.edu/sectionE.php#algae).

A summary of published efficacy data on algae control is available in Waterborne Solutions at https://www.cleanwater3.org/gsearch.asp

Be cautious about applying algaecides directly on foliage or substrates. A study from the University of Florida showed that products that prevented algae from accumulating on the surface of substrates also resulted in smaller crops. Visual lesions were not observed, so the negative effects may not always be visible.

An ideal method to prevent algae is to follow a consistent sanitation protocol that includes preventing free moisture on surfaces, consistent brushing or washing surfaces (that includes emitters, tables, etc.), and shock sanitation when there are no crops in the growing area.

It is very difficult to prevent algae in irrigation systems because they remain wet all the time and generally, we use water soluble fertilizers. Mechanical or chemical options cannot always be implemented during the growing season because they can harm the crop. Our lab is currently studying if pipe materials and emitters differ in accumulating algae. We will keep you posted! For now, shock the irrigation lines with a high concentration of sanitizer and high-water pressure when the greenhouse is empty.

Figure 5. Pressure washing nutrient film technique channels.

Additional resources:

1. Chase AR. 2018. Update on algae control on ornamentals. GPN Magazine. April 2018:24-26 https://gpnmag.com/article/update-on-algae-control-on-ornamentals/
2. Pundt, L. 2021. Weeds, Algae,& Liverworts Section E in: New England Greenhouse Floriculture Guide http://negfg.uconn.edu/sectionE.php
3. Waterborne solutions in: CleanWateR³ **https://www.cleanwater3.org/growertools.asp**

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