

# Little Leaf Farms Overpowers Algae



"The solution we worked with TURI on, which is a physical means of removing the algae, is both scalable and sustainable – consistent with our needs and mission."

Matthew Meisel,  
Chief Financial Officer,  
Little Leaf Farms

## Overview

Little Leaf Farms grows lettuce greens year-round in a protective greenhouse located in Devens, MA. Little Leaf received a grant from the Toxics Use Reduction Institute (TURI) to evaluate an effective approach to cleaning their growing gutters without using chemicals. Unwanted algae was growing in the gutters in which the lettuce is grown, and the algae needed to be cleaned out before the next lettuce-growing cycle. TURI partnered with Boce Zhang, Assistant Professor of Biomedical and Nutritional Sciences at UMass Lowell, to perform a scientific study evaluating a high-pressure washer to do the job. Professor Zhang and his team of students were able to validate the cleaning capacity of the washer and recommend a minimum temperature for its use.

## The Mechanics of Growing Greens at Little Leaf Farms

Little Leaf employs nutrient film technique (NFT) to grow their lettuces. NFT is a hydroponic growing technique that uses a shallow stream of nutrient-rich water to circulate over plant roots through a channel, gutter, or tube. Little Leaf seeds lettuce in mineral wool (e.g., Rockwool), a natural fibrous material, supported in a series of plastic gutters across their 2½-acre facility. Unfortunately, the plant nutrients and the water used for this hydroponic system can grow algae as effectively as lettuce. At the end of the 28-day seed-to-harvest cycle, the gutters are contaminated with algae and require cleaning.



## Testing of the Pressure Washer

Little Leaf wanted to ensure the cleanliness of the gutter system but also wanted to avoid the use of toxic chemicals. Using toxic chemicals would not be consistent with their mission and values. They purchased a high-pressure, variable-temperature washer to power spray the gutters clean for the next crop. Little Leaf understood that measuring cleanliness is critical and that their internal visual evaluation was not as accurate a test as they needed. They also intend to expand operations. It was important to install a cleaning system that could scale up as they grow.



*Dr. Boce Zhang and two students performing tests at Little Leaf Farms*

The ability of the pressure washer to remove or inactivate the algae was based on determining the difference between algal biofilm concentration pre-treatment and post-treatment of the pressure washing on the plastic gutters. Based on the test results, the high-pressure washer removed the algal biofilm. The water temperature was also optimized for algae removal. This was conducted by demonstrating that 140° Fahrenheit is the optimal temperature for removing algae from the growing gutters.

## Investment Evaluation

The facility also completed a basic cost comparison of alternatives to support their implementation of a high-pressure washer over a chemical system. Though the up-front costs of the pressure washer were higher than for the chemical system, the additional costs associated with the chemical system and the fact that it was not in step with Little Leaf's mission outweighed the capital costs.

| Comparison of Alternatives     |   |   |
|--------------------------------|---|---|
| Decision Factor                | Chemical Sanitization   | Water Pressure Washer   |
| Capital Expense                | \$2,000 for pump and pressure foaming applicator  | \$10,000 for washer   |
| Operating Expense              | \$100 or more per day (chemical costs), depending on chemical   | \$100 per day   |
| Additional Cost Considerations | Design of chemical storage area as none existed at the facility; new cost of chemical waste disposal as no chemicals were used previously; additional chemical management costs (e.g., personal protective equipment and chemical tracking) | Predictable energy use; no wastewater treatment required prior to discharge to septic |
| Little Leaf Mission            | Inconsistent with sustainability mission  | Supports sustainability mission   |

## Next Steps

With help from TURI and UMass Lowell researchers, Little Leaf Farms now knows with confidence that the detrimental algae is being removed from their plastic growing gutters. As the facility continues to expand its footprint, Little Leaf will be able to tackle contamination issues with the high-pressure washer and not need to purchase and use hazardous chemicals in increasing quantities. Little Leaf's management team is happy to be saving money by using their cleaning equipment at an optimal temperature.



*The Toxics Use Reduction Institute (TURI) at UMass Lowell provides the resources and tools to help Massachusetts companies and communities make the Commonwealth a safer place to live and work. TURI awards grants to businesses, community organizations, and researchers to discover new opportunities to reduce the use of toxic chemicals and to demonstrate technologies to peers. For more information, visit <http://www.turi.org> or contact Joy Onasch ([joy@turi.org](mailto:joy@turi.org), 978-934-4343).*