



Evaluating Alternative Static Hydroponic Solutions-Part 3

Pono Chung¹, Jari Sugano¹ and Jensen Uyeda²

University of Hawai'i at Mānoa, College of Tropical Agriculture and Human Resources

¹Oahu County, ²Department of Tropical Plant and Soil Sciences

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Introduction

Growing lettuce in a static hydroponic system is a simple and easy way to grow leafy greens commercially, at home or in school/community garden. The static hydroponic system, developed by Dr. Bernard Kratky of the University of Hawai'i at Mānoa, College of Tropical Agriculture and Human Resources (CTAHR), consists of a 3-part fertilizer blend of: Hydro-Gardens' Chem-grow Lettuce Formula 8-15-36 (Chem-grow), calcium nitrate and magnesium sulfate (Epsom salt). Hydro-Gardens is discontinuing shipping their Chem-grow Lettuce Formula 8-15-36 to Hawaii. A series of field trials were conducted to find a comparable solution for school and backyard gardens.



Photo 1: Current standard: Variety of lettuce grown using Hydro-Gardens' Chem-grow Lettuce Formula 8-15-36.

Methodology

[Initial observational trials were started on September 2022](#), comparing Chem-grow Lettuce Formula 8-15-36 to Greenway Biotech Lettuce Formulation 8-15-36 (purchased from Amazon). In September 2023, a [second field trial](#) was conducted comparing Chem-grow Lettuce Formula 8-15-36 to Nutriculture High Cal-Mag Vegetable 12-31-14 (Plant Marvel) and Greenway Biotech Lettuce Formulation 8-15-36 (Amazon). In this field trial, we compared Chem-grow Lettuce Formula 8-15-36 to Greenway Biotech Lettuce Formulation 8-15-36 (Amazon) and MasterBlend's Tomato and Vegetable Formula 4-18-38 (Amazon/Walmart).

Thirty-six lettuce seedlings consisting of three different varieties of lettuce (green leaf, red leaf, butterhead) were planted in a 4'x4' static hydroponic bin. The Chem-grow lettuce formulation was mixed at a rate of 1 tsp /gallon of water. Masterblend and Greenway were mixed at the same rate of ½ tsp/ gallon. For all beds, calcium nitrate was applied at 1 tsp / gallon of water and magnesium sulfate at 1/2 tsp per gallon of water. Six heads of each variety of lettuce were selected randomly, harvested and weighed individually on November 27, 2023.



Photo 2 (left): Lettuce grown using Greenway Biotech Lettuce Formulation 8-15-36. **Photo 3 (right):** Lettuce grown using MasterBlend's Tomato and Vegetable Formula 4-18-38.

Estimated Cost Per Head*

[Previous analysis of the cost of using the Hydro-Gardens' Chem-grow Lettuce Formula 8-15-36 \(2018\)](#) was \$0.03 / head.

Ex. Hydro Garden's Chem-Grow Lettuce Formula 8-15-36 (2018): \$3.04/ pound (453 grams).
Estimated rate per head using rate of 1 tsp/gallon: 5 grams = \$0.03

Greenway Biotech Lettuce Formulation 8-15-36 (2022): \$9.86/ pound (453 grams).
Estimated rate per head using rate of ½ tsp/gallon: 2.5 grams = \$0.05

MasterBlend Tomato and Vegetable Formula 4-18-38 (2023): \$14.65/ pound (453 grams)
Estimated rate per head using rate of ½ tsp/gallon: 2.5 grams = \$0.8

**Cost of lettuce formula only, not including cost of calcium nitrate or magnesium sulfate*

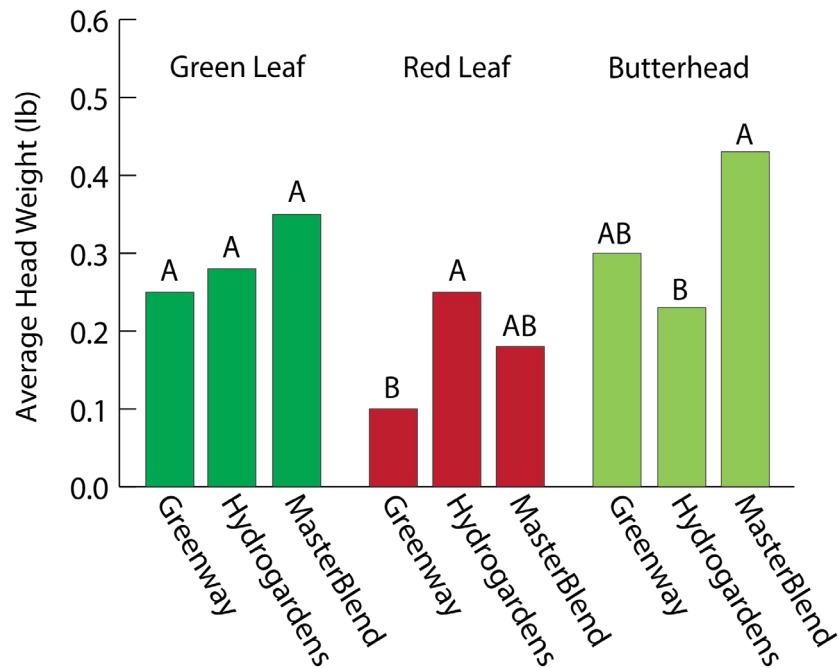


Figure 1. Mean analysis showing differences between hydroponic lettuce formulations and effect on lettuce types.

Summary

Preliminary findings showed the Greenway was comparable to Chem-grow for green leaf and butterhead lettuce types. However, Greenway did not do as well as Chem-grow for red leaf varieties. Overall, the MasterBlend lettuce heads were significantly larger than Hydro-Gardens and Greenway. MasterBlend lettuce heads showed little to no tip burn on all lettuce types. MasterBlend performed the same as Chem-grow for green and red leaf varieties. However, MasterBlend's yield was significantly higher than Chem-grow for butterhead lettuce.

Based on our preliminary findings, home and school garden programs may opt to replace the Hydro-Gardens' Chem-grow Lettuce Formula 8-15-36 (Chem-grow) with Greenway Biotech Lettuce Formulation 8-15-36 (Amazon) and/or MasterBlend's tomato and vegetable Formula 4-18-38 (Amazon/Walmart) for comparable cost and results. Environmental conditions and lettuce cultivar selections can affect how each hydroponic solution performs. Implications of these studies are limited to small, static hydroponic units, not commercial scale operations.

References

[Chung, P., C. Hanakawa, T. Lau, J. Uyeda, A. Ahmad, and J. Sugano. Hydroponic Solutions for Backyard or Classroom Systems. University of Hawaii at Mānoa, College of Tropical Agriculture and Human Resources. Sustainable and Organic Agriculture Program. HanāiʻAi Newsletter Volume 47. 2022.](#)

[Chung, P., J. Sugano and J. Uyeda. Evaluating Alternative Static Hydroponic Solutions. Sustainable and Organic Agriculture Program. HanāiʻAi Newsletter Volume 51. 2023.](#)