

## *Hydroponic Test Results (Lettuce)-2014*



### ***CHI Liquid Fulvic (Concentrate) Increased Hydroponic Production of Lettuce***

**Objective:** To use fulvic acid to increase the yield of lettuce grown in hydroponic units  
**Financial support:** Canada Revenue Agency (Scientific Research & Experimental Development)  
**Period:** October 2013 to February 2014  
**Tested product:** CHI Liquid Fulvic (Concentrate) - source of fulvic acid  
**Tested plant:** Lettuce of "Grand Rapids" variety  
**Location:** Canadian Humalite International Inc, Alberta, CANADA  
**Hydroponic unit:** 50 cm long x 40 cm wide x 13 cm water deep  
**Growing solution:** Water containing 224 ppm N, 448 ppm P<sub>2</sub>O<sub>5</sub>, and 288 ppm K<sub>2</sub>O

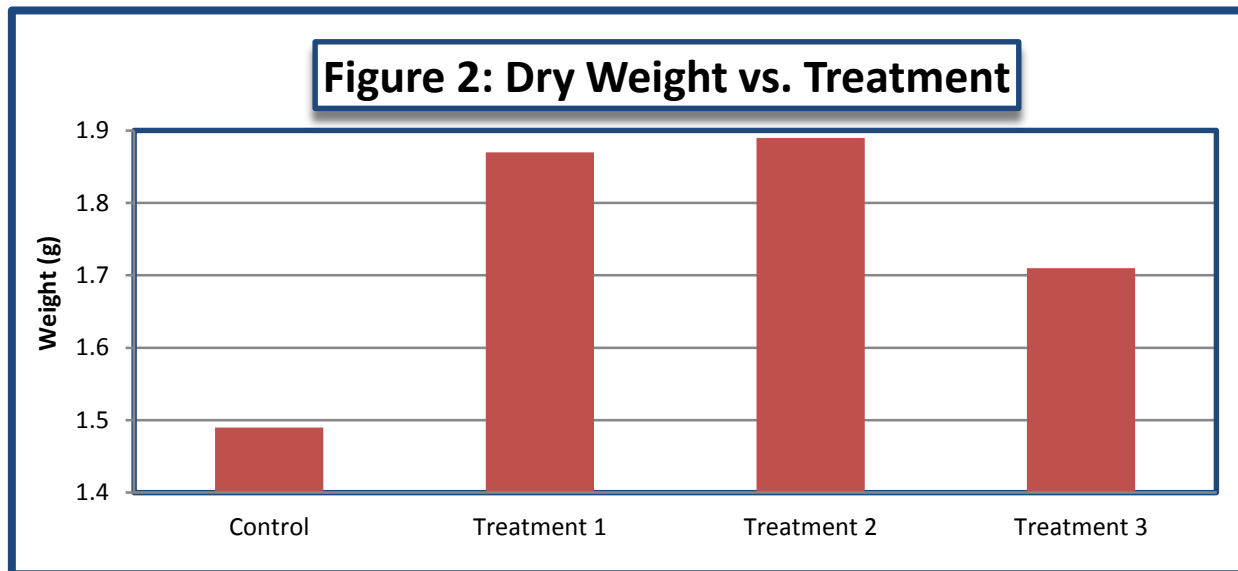
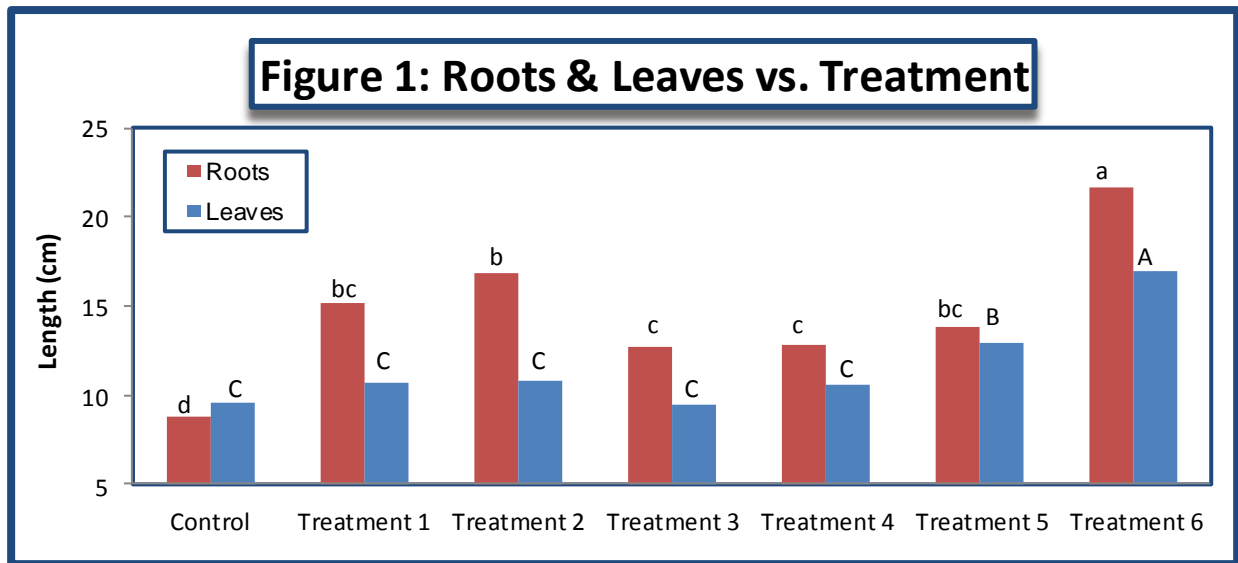
### ***Design of Experiments***

- Twelve (12) seedlings of 2 weeks old were grown in each hydroponic unit, representing 12 replications for each treatment
- Seven (7) hydroponic units were utilized as Control and Treatments 1 to 6:
  - Control – growing solution
  - Treatment 1 – growing solution + 0.007% CHI Liquid Fulvic (Concentrate)
  - Treatment 2 – growing solution + 0.05 % CHI Liquid Fulvic (Concentrate)
  - Treatment 3 – growing solution + 0.4% CHI Liquid Fulvic (Concentrate)
  - Treatment 4 – growing solution + 0.6% CHI Liquid Fulvic (Concentrate)

- Treatment 5 – growing solution + 1.4% CHI Liquid Fulvic (Concentrate)
- Treatment 6 – growing solution + 4.2% CHI Liquid Fulvic (Concentrate)
- CHI Liquid Fulvic (Concentrate) also contained 0.76% K<sub>2</sub>O and other negligible nutrients
- Plants were harvested after two (2) months
- Roots and leaves for each replicate were measured and analyzed for means, standard deviations, ANOVA ( $P = 0.05$ ), and Fisher's least significant difference ( $\alpha = 0.05$ ).
- Dry plants for each treatment were weighed and analyzed for means

**Results**

CHI Liquid Fulvic (Concentrate) at rates between 0.007 and 0.05% (Treatments 1 and 2) enhanced the growth of roots, leaves, and plant dry weights by 91, 13, and 27%, respectively. All were reduced at higher rates (Treatments 3 and 4), however at much higher rates (Treatments 5 and 6) they again increased due to the presence of nutrients (i.e. potassium) in the growing solution.



**Conclusions**

CHI Liquid Fulvic (Concentrate) at application rates between 0.007 and 0.05% enhanced the growth and dry weight of lettuce grown in hydroponic units.