

FIELD TEST RESULTS

WHEAT



2012

CHI LIQUID CARBON 9-5-3 INCREASED CROP PRODUCTION OF WHEAT

- **Objective:** To use organic matter (humic acids) chelated nutrients to increase yield of wheat
- **Collaborator:** Battle River Research Group, Camrose, Alberta, CANADA
- **Financial support:** Canada Revenue Agency (Scientific Research & Experimental Development)
- **Period:** May to September, 2012
- **Tested product:** CHI Liquid Carbon 9-5-3 (source of humic acids and 9-5-3 nutrients)
- **Tested crop:** Wheat - "Harvest" variety
- **Location:** Camrose, Alberta, CANADA
- **Soil:** loam with solonetzic clay underneath, 6% organic matter, pH = 5.8
- **Test plot:** 11 x 22 ft² (3.3 x 6.6 m²)

■ DESIGN OF EXPERIMENTS

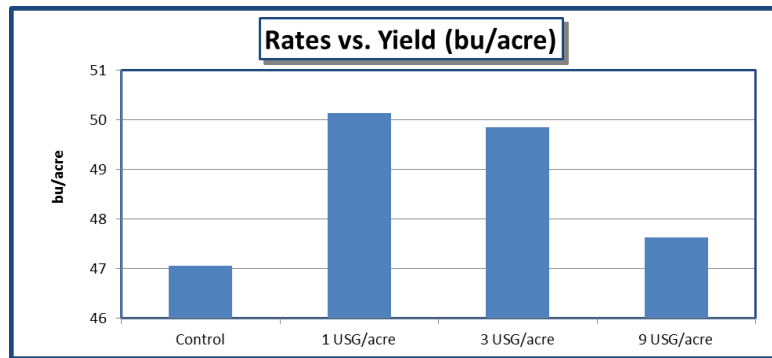
- **Treatment 1:** 30 lbs N/ acre + 10 lbs P₂O₅/acre
- **Treatment 2:** 30 lbs N/ acre + 10 lbs P₂O₅/acre + 1 USG CHI Liquid Carbon 9-5-3/acre
- **Treatment 3:** 30 lbs N/ acre + 10 lbs P₂O₅/acre + 3 USG CHI Liquid Carbon 9-5-3/acre
- **Treatment 4:** 30 lbs N/ acre + 10 lbs P₂O₅/acre + 9 USG CHI Liquid Carbon 9-5-3/acre
- Nutrients and CHI Liquid Carbon 9-5-3 were applied during seeding
- Each treatment was replicated 4 times, i.e. 4 test plots per treatment
- Yield for each test plot was measured, and results from 4 test plots of the same treatment were averaged. Yields were presented as bu/acre (1 bushel = 60 lbs)
- Note: each USG of CHI Liquid Carbon 9-5-3 added 0.9, 0.5, and 0.3 lbs of N, P₂O₅, K₂O / acre, respectively to soil

■ RESULTS

The best result occurred when 1 USG/acre of CHI Liquid Carbon 9-5-3 was applied, in which over 6.5% yield increased was observed over control. Increased rates did not result in better yields.

■ CONCLUSIONS

The yield of wheat was significantly increased by adding small amount of organic matter (humic acids) chelated nutrients. Recommended rates for CHI Liquid Carbon 9-5-3 were 1 to 2 USG/acre, applied once to soil during seeding or on seedling stage, or sprayed on fully grown plants prior to 10% flowering.



CHI LIQUID FULVIC (CONCENTRATE) INCREASED CROP PRODUCTION OF WHEAT

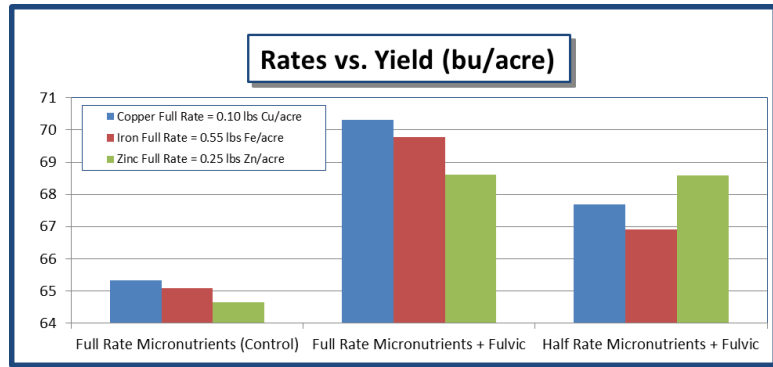
- **Objective:** To use organic matter (fulvic acid) to increase yield of wheat
- **Collaborator:** Battle River Research Group, Camrose, Alberta, CANADA
- **Financial supports:** National Research Council (Industrial Research Assistant Program), Agriculture & Agri Food Canada (Canadian Agriculture Adaptation Program), and Canada Revenue Agency (Scientific Research & Experimental Development)
- **Period:** May to September, 2013
- **Tested products:** CHI Liquid Fulvic (Concentrate) - source of fulvic acid and micronutrients (copper, iron, and zinc)
- **Tested crop:** Wheat - "Harvest" variety
- **Location:** Camrose, Alberta, CANADA
- **Soil:** Loam, solonetzic clay underneath, OM = 6%, pH = 6.1, EC = 0.3 mS/cm
- **Test plot:** 4.5 x 22 ft² (1.4 x 6.6 m²)

■ DESIGN OF EXPERIMENTS

- Macronutrients (60 lbs N/acre + 20 lbs P₂O₅/acre) were applied for each treatment during seeding
- Micronutrients (copper, iron, and zinc) and CHI Liquid Fulvic (Concentrate) were foliarly applied on seedlings, i.e. 2 weeks after seeding
- Copper sulfate micronutrient treatments:
 - **Treatment 1 (Control):** 0.10 lbs Cu/acre
 - **Treatment 2:** 0.10 lbs Cu/acre + 6 ounces (170 mL) Liquid Fulvic (Concentrate)/acre
 - **Treatment 3:** 0.05 lbs Cu/acre + 6 ounces (170 mL) Liquid Fulvic (Concentrate)/acre
- Iron sulfate micronutrient treatments:
 - **Treatment 4 (Control):** 0.55 lbs Fe/acre
 - **Treatment 5:** 0.55 lbs Fe/acre + 6 ounces (170 mL) Liquid Fulvic (Concentrate)/acre
 - **Treatment 6:** 0.28 lbs Fe/acre + 6 ounces (170 mL) Liquid Fulvic (Concentrate)/acre
- Zinc chloride micronutrient treatments:
 - **Treatment 7 (Control):** 0.25 lbs Zn/acre
 - **Treatment 8:** 0.25 lbs Zn/acre + 6 ounces (170 mL) Liquid Fulvic (Concentrate)/acre
 - **Treatment 9:** 0.13 lbs Zn/acre + 6 ounces (170 mL) Liquid Fulvic (Concentrate)/acre
- Each treatment was replicated 3 times, i.e. 3 test plots per treatment
- Yield for each test plot was measured, and results from 3 test plots of the same treatment were averaged. Yields were presented as bu/acre (1 bushel = 60 lbs)
- Note: Liquid Fulvic had no significant amount of macro/micronutrients

■ RESULTS

At the same rates of micronutrients, foliar application of Liquid Fulvic (Concentrate) resulted in 6.0 to 7.7% yield increases. At 50% reduced rates of micronutrients, 2.8 to 6.0% yield increases were observed. This indicated that Liquid Fulvic (Concentrate) increased micronutrient uptakes by plants.



■ CONCLUSIONS

Small amount of organic matter (fulvic acid) increased yield of wheat significantly. Even at 50% reduced rates of micronutrients, yield increases were still observed. Recommended foliar rate for Liquid Fulvic (Concentrate) was 6 ounces (170 mL)/acre.