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, K20 / 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 increase 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.
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, solonetizic 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.