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FIELD TEST RESULTS
HIGH-SALINITY SOIL

2013

RECOVERY OF NON-CULTIVABLE HIGH-SALINITY SOIL WITH CHI LIQUID CARBON 12%

High-salinity soil decreases crop yield due to reduced ability of plants to take up water from soil and higher burnt-off incidences for young leaves. High-salinity soil is sometimes linked with high pH, which reduces the availability of nutrients like zinc, iron, and phosphorous. Crops such as dry beans, sorghum, and silver maples are sensitive to high pH, while corn and wheat are moderately susceptible.

High-salinity soil may be caused by an excessive use of nitrogen fertilizers. Humic organic matter helps reducing the amount of fertilizer without reducing the yield as it makes nutrients more available to plants.

- **Objective:** To apply organic matter (humic acids) in a non-cultivable high-salinity soil
- **Collaborators:** P. Verdi and M. Cano at Bates Farm, Gadsby, Alberta, CANADA
- **Financial support:** Canada Revenue Agency (Scientific Research & Experimental Development)
- **Period:** June to September, 2013
- **Tested product:** CHI Liquid Carbon 12% (source of humic acids)
- **Tested crop:** Wheat, "CDC Go" variety
- **Location:** Gadsby, Alberta, CANADA
- **Soil:** 40% dark brown solodized solonetz, 40% dark brown solod, 20% orthic dark brown Chernozem
- **Test area:** 17.9 acres

DESIGN OF EXPERIMENTS

- **Treatment 1:** 0 USG CHI Liquid Carbon 12%/ acre + 110 lbs 46-0-0/acre, applied to normal zone
- **Treatment 2:** 10 USG CHI Liquid Carbon 12%/ acre + 110 lbs 46-0-0/acre, applied to saline soil zone, that can be divided in three subzones:

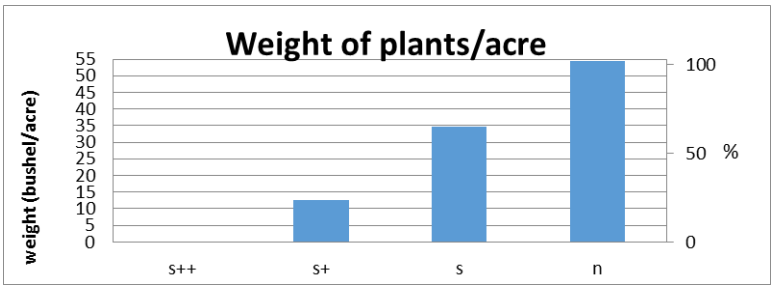
  Normal zone was very low in salt, crops could grow without problems. Subzone S was slightly saline, sensitive crops decreased its yield. Subzone S+ was moderately saline, yield decreased for most crops. Subzone S++ was extremely saline, no crops grew. During harvest, a sample of 1m² was obtained from each zone, which

was extrapolated to 1 acre. Each sample was measured for total plant and grain weights. Yields were presented as bu/acre (1 bu = 60 lbs).

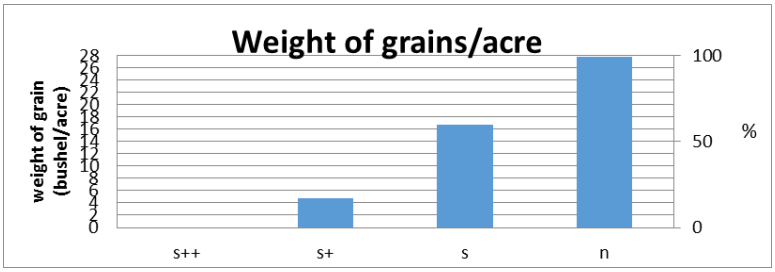
	N=Normal	S = Slightly saline	S+= Moderately saline	S++= Extremely saline
EC (dS/m)	0.81	1.53	7.02	38.3
pH	6.26	7.05	7.5	7.78

RESULTS

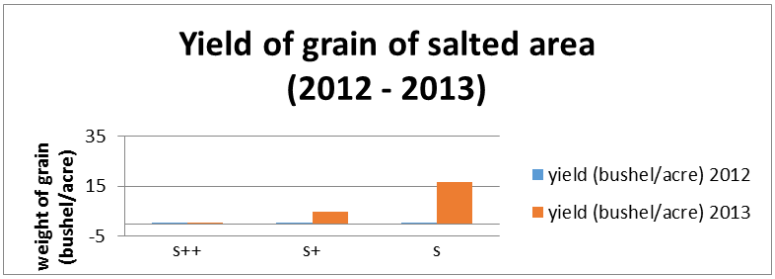
Due to CHI Liquid Carbon 12% application, subzones s+ and s (which were previously non-cultivate) showed plant yields of 22.9 and 63.7% from the normal zone's at 54.6 bu/acre, respectively.



Subzones s+ and s also showed grain yields at 17.4 and 60.1% from the normal zone's at 27.73 bu/acre, respectively.



Due to CHI Liquid Carbon 12% application, grain yields increased significantly in the interval of one year for subzones s+ and s at 4.8 and 16.7 bu/acre, respectively. Subzone "s++" remained non-cultivate. Knowing that the saline frame was non-cultivate for years, it was evident that the application of Liquid Carbon 12% was relevant.



CONCLUSIONS

The application of organic matter (CHI Liquid Carbon 12%) at 10 USG/acre enhanced recovery of high-salinity soil significantly.

2014

CHI LIQUID CARBON REDUCED SOIL SODIUM ADSORPTION RATIO (SAR) AND ELECTRICAL CONDUCTIVITY (EC)

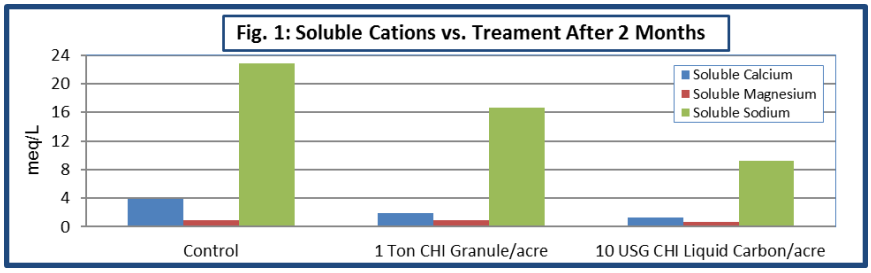
- **Objective:** To use humic acids to reduce soil SAR and EC
- **Collaborator:** Bates Farm, Gadsby, Alberta, CANADA
- **Financial support:** Canada Revenue Agency (Scientific Research & Experimental Development)
- **Period:** October 2013 to July, 2014
- **Tested product(s):** CHI Granule (source of raw humic acids), CHI Liquid Carbon (source of extracted humic acids)
- **Location:** Gadsby, Alberta, CANADA
- **Soil:** 40% dark brown solod, 40% dark brown solodized solonetz, and 20% orlic dark brown chernozem
- **Tested area:** 4 acres (1.6 ha)

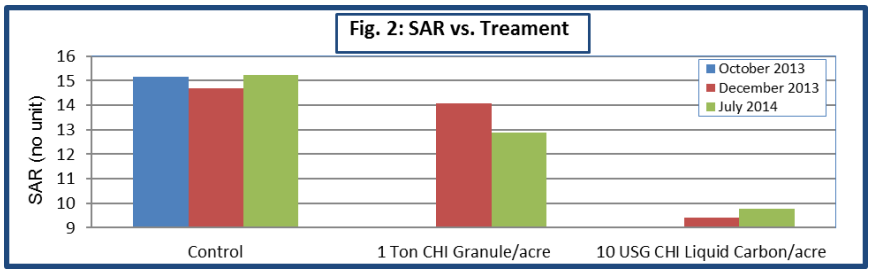
DESIGN OF EXPERIMENTS

- Three soil samples were taken from tested area, aggregated, and analyzed for pH, soluble calcium, soluble magnesium, soluble sodium, SAR, and EC
- Three test plots of 65 ft2 (6 m2) each were randomly selected from tested area:
    - Plot 1 - no product application (control)
    - Plot 2 - 2,000 lbs (1 ton) CHI Granule/acre was applied in October 2013
    - Plot 3 - 10 USG (38 L) CHI Liquid Carbon/acre was applied in October 2013
- Three soil samples were taken from each plot in December 2013, aggregated, and analyzed for pH, soluble calcium, soluble magnesium, soluble sodium, SAR, and EC
- Three soil samples were taken from each plot in July 2014, aggregated, and analyzed for pH, soluble calcium, soluble magnesium, soluble sodium, SAR, and EC

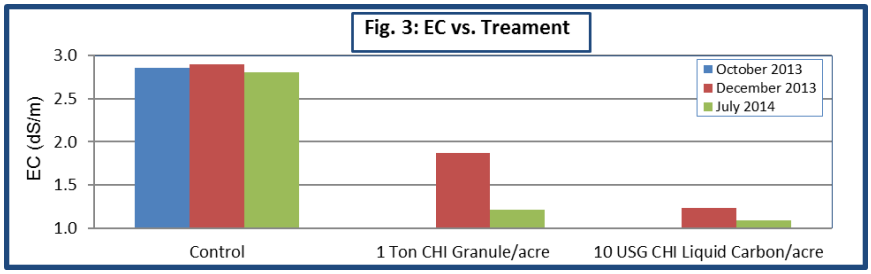
RESULTS

Background soil contained high levels of SAR (around 15) and EC (around 2.8 dS/m), beyond acceptable limits of 13 and 2 dS/m, respectively. CHI Liquid Carbon at 10 USG/acre performed better than CHI Granule at 1 ton/acre in reducing soil soluble cations, SAR, and EC. CHI Granule reduced soil SAR to 12.9 after 9 months of treatment. CHI Liquid Carbon reduced it to 9.4, and met its target, only after 2





months of treatment. After 2 months, both products reduced soil EC below its limit, i.e. 1.87 dS/m for CHI-Granule and 1.21 dS/m for CH-Liquid Carbon.



CONCLUSIONS

CHI Liquid Carbon and CHI-Granule reduced soil soluble cations, SAR, and EC. CHI Liquid Carbon at 10 USG/acre performed better reducing SAR and EC from 15 and 2.8 dS/m down to 9.4 and 1.21 dS/m, respectively after 2 months of application.