Liquefied Organic Matter Trials

by M. Cano, P. Verdi & E. Liem

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Organic matter improves tilling properties and increases soil water holding capacity in soil. It also makes nutrients in soil more readily available to plants as they leach through soil at minimum rates. Most importantly, due to their unique chemical and physical compositions, organic matter-bound nutrients have been proven to be very efficiently utilized by plants. Organic matter is no doubt one of the most important key ingredients to increase soil productivity, which ultimately results in higher crop yields.

However, there are many types of organic matter with different methods of application, in which practicability and efficiency can be a concern. Canadian Humalite International Inc. of Edmonton, Alberta, Canada, has been making an effort to mitigate this challenge by utilizing low-quality coal (non-hazardous material, energy value around 7,000 BTU/lb) as a source of organic matter. This material is transported from the mine, crushed, liquefied, combined with nutrients and then applied to soil and/or plants. Rather than using it as a non-efficient source of energy, this coal material is developed into products which are beneficial to soil.

The products are applied to soil/seeds, seedlings, and plants up to 15 percent flowering through drip irrigation and pivot/spray systems. Significant yield increases have been observed on various crops grown in different types of soil and climate regions in Canada and the United States. The following example is one of the most recent findings obtained from a field trial completed in Forrestburg, Alberta, Canada, in 2013.

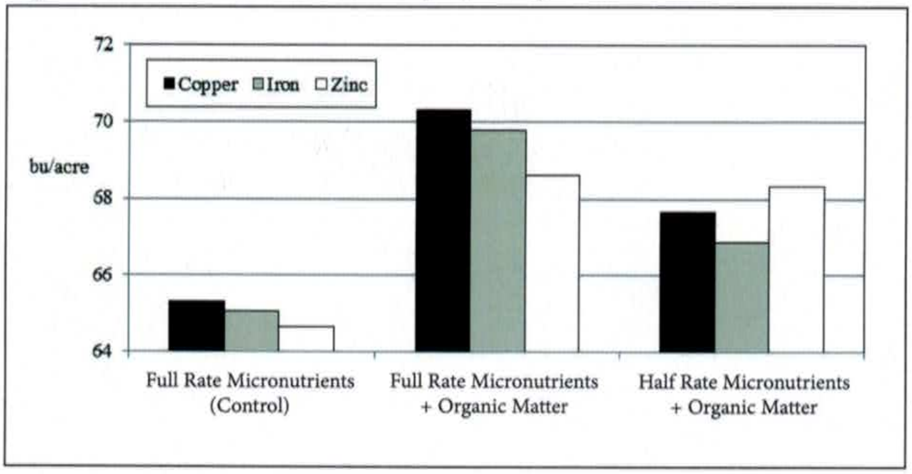
Soil in the area was loam with solonetzic clay underneath, degree of acidity (pH) = 6.1, electrical conductivity (EC) = 0.3 ds/m and organic matter = 6.0%. It contained available macronutrients at 51 lbs nitrogen (N)/acre, 43 lbs phosphorus (P_2O_5)/acre, 631 lbs potassium (K_2O)/acre, and 75 lbs sulfur (SO_4)/acre. Available micronutrients were 0.8 ppm copper (Cu)/acre, 0.9 ppm boron (B)/acre, 4 ppm zinc (Zn)/acre, 21 ppm manganese (Mn)/acre, and 160 ppm iron (Fe)/acre. Nutrient analyses indicated that the soil was deficient in nitrogen, marginal in phosphorus and copper, adequate in boron and zinc, and optimum in other nutrients.

The field trial was completed at 27 outdoor test plots of 4½ feet x 22 feet (99 square-feet) each (see Figure 1). Wheat of "Harvest" variety was planted in each plot in May. Macronutrients were applied on each plot during seeding at 60 N and 20 P_2O_5 lbs/acre. Micronutrients and liquefied organic matter were sprayed two weeks later on seedlings. On

Figure 1: Test plots in Forrestburg, Alberta, Canada

A field trial was completed using 27 outdoor test plots of 4 ½ feet x 22 feet each.

Figure 2: Treatment vs. Yield (bu/acre)



each of the control plots, copper sulfate was sprayed at a rate of 0.10 lbs Cu/acre, iron sulfate at 0.55 lbs Fe/acre, and zinc chloride at 0.25 lbs Zn/acre. On each of the treated plots, a liquid product of Canadian Humalite International Inc. containing 1.5% liquefied organic matter was sprayed at a rate of 6 ounces/acre (or 2.55 g liquefied organic matter/acre) in combination with each micronutrient. The micronutrient rates were 0.10 and 0.05 lbs Cu/acre, 0.55 and 0.28 lbs Fe/acre, and 0.25 and 0.13 lbs Zn/acre. Each control and treated plot was replicated three times. Harvest was made in September, in which yields from each replicate were averaged and recorded as bushel/acre (*note: 1 bushel of wheat weighed 60 lbs*).

It was found that crop yields increased from 64.7 to 65.3 lbs/acre (control) to 68.6 to 70.3 lbs/acre when liquefied organic matter was incorporated (see Figure 2). In comparison to control, zinc micronutrient experienced the lowest increase at 6.0%, while copper the most at 7.7%. Even when the micronutrient applications were reduced to approximately one-half (50%) of the original rates (control), yield increases were still observed at 67.7 to 68.3 lbs/acre when liquefied organic matter was incorporated. In comparison to control, iron micronutrient had the lowest increase at 2.8%, while zinc the highest at 6.0%. Although detailed mechanisms were not investigated in this trial, it suggested that liquefied organic matter helped the plant to utilize the applied micronutrients more efficiently, resulting in higher crop yields. This would be great news for end users as they could enjoy a higher crop yield or a lower input cost while maintaining the same yield and reduced nutrient rates would also promote a healthier soil environment.

Most interestingly, the trial was completed in a relatively good quality of soil. Past experiences showed more dramatic results when similar crops were grown in poorer quality of soils (such as those with lower organic matter). In this case, the end users could reap a double benefit on the higher crop yield and reduced input cost.

In summary, liquefied organic matter did improve crop yields even at reduced nutrient rates.

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