

Organic Matter Products Increase Yields

Organic matter improves soil quality, increasing the retention of moisture and vital nutrients. Nutrients are also best utilized by plants when bound with OM, however, some OM products are not practical to apply and/or are mainly insoluble in water. The latter results in larger product amounts required to allow significant differences to be observed, meaning higher product and application costs.

Canadian Humalite International Inc. of Edmonton, Alberta, Canada, examined a solution to this challenge by manufacturing commercial products derived from low-energy coal as a source of concentrated soil organic matter.

Product A was manufactured by crushing the raw material into powder with a mean particulate size of 2.1 mm. The product had a pH of 4.1, was not readily soluble in water and contained 53.3 percent OM, 31.4 percent moisture and other inert components. This product could easily be applied to soil using a spreader.

Product B was manufactured by liquefying Product A in water. It had a pH of 10.2, was practically 100 percent water soluble and contained 9.0 percent OM, 89.6 percent moisture, 1.5 percent potassium and other inert components. This liquid product could be applied to soil or plants using a sprayer. Product A was a good choice when utilized to enhance the quality of soil for a longer period of time, while Product B was intended for instantaneous usage by the plants. Field trials in North America showed that both products significantly enhanced yields of wheat and other crops.

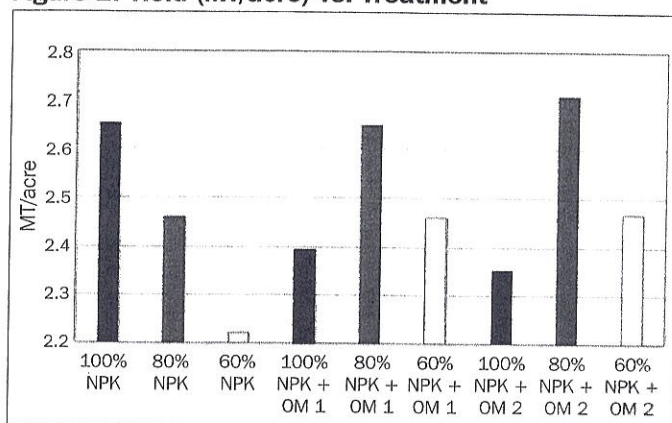
A field trial was completed in the Mekong Delta, Vietnam, during the dry season of August to November 2011. Soil was alluvial with the following: 5.5 pH, 2.7 percent OM, 0.2 percent total nitrogen, 2.8 ppm available Olsen's phosphorus, 4.9 cmol/kg exchangeable potassium and cation exchange capacity (CEC) of 20 cmol/kg. The tested crop was rice of OM5451 common variety with a 90-day harvest.

Figure 1: Design of Experiment

No	Treatment	Nutrients	Product A (Dry OM)	Product B (Liquefied OM)
1	Control	100%	0	0
2	Control	80%		
3	Control	60%		
4	OM 1	100%	47 lbs/acre before sowing	0.26 lbs OM/acre on day 40 after sowing + 0.13 lbs OM/acre on day 55 after sowing
5	OM 1	80%		
6	OM 1	60%		
7	OM 2	100%		0.13 lbs OM/acre each on days 15, 40, and 55 after sowing
8	OM 2	80%		
9	OM 2	60%		

Note: 100% nutrients = 88N-35P₂O₅-26K₂O lbs/acre, applied before sowing.

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



Experiments were designed as shown in Figure 1. For each of treatments 1-9, nutrients (N-P₂O₅-K₂O) were applied before sowing at rates of 88-35-26, 70-28-22 and 53-21-16 lbs/acre. Product A at 47 lbs OM/acre was applied to soil for each of Treatments 4-9 before sowing. Product B at 0.39 lbs OM/acre was applied foliar to plants during growing season as follows: 0.26 lbs OM/acre on day 40 after sowing plus 0.13 lbs OM/acre on day 55 after sowing for each of Treatments 4-6 (identified as "OM1"), and 0.13 lbs OM/acre on day 15, 40 and 55 after sowing for each of Treatments 7-9 (identified as "OM2"). Each treatment was replicated three times. Yields were recorded and averaged for each treatment (see Figure 2).

As expected, reducing nutrient inputs from 88N-35P₂O₅-26K₂O lbs/acre (100 percent) to 70N-28P₂O₅-22K₂O lbs/acre (80 percent) and 53N-21P₂O₅-22K₂O (60 percent) resulted in lower yields of 7 and 16 percent, respectively. Adding Products A and B to 100 percent nutrient input resulted in up to 13 percent lower yields, suggesting that the combined nutrients and OM at these levels were too much for the plants. At 80 percent nutrient input, OM increased crop yields by up to 10 percent over controls; and at 60 percent nutrient input, by up to 11 percent. No significant differences were observed between early or evenly distributed applications of Product B during the growing season (i.e. OM 1 and OM 2 Treatments, respectively).

Most interestingly, 80 percent nutrients plus OM inputs maintained or even slightly increased crop yields compared to that of 100 percent nutrient input at 2.65 MT/ha; while 60 percent nutrients plus OM inputs maintained yields of 80 percent nutrient input at 2.46 MT/ha. These results suggest that the same yield could be achieved by reducing nutrients by 20 percent with the incorporation of OM within the input.

In summary, organic matter at low application rates of 47 lbs/acre Product A and 0.39 lbs/acre Product B enhanced rice yields by up to 11 percent, or maintained them while reducing nutrient inputs by 20 percent.

Cuu Long Rice Research Institute, Cantho, Vietnam, completed the trial. Submitted by: A. Tho, Eco-Tiger, Ho Chi Minh City, Vietnam and E. Liem, Canadian Humalite International Inc., Edmonton, Alberta, Canada, canadianhumaliteinternational.com.