Project Report

Earth Renew OM Plus Product Evaluation 2008

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I. Background

Potatoes managed for maximum productivity exert a heavy demand on soil fertility (Stark and Westerman, 2003). In Alberta, potato crops receive relatively high rates of mineral fertilizer and are frequently grown on soils low in soil organic matter. Animal manure and composted animal manure can be used as a source of N, P, K and organic matter. Transport of manure is often not economical because of high water content, low manure N concentrations and transportation logistics and costs (Zebarth et al., 2005).

Earth Renew OM Plus is a pelletized soil amendment made from processed feedlot manure and bedding. The product is a source of nitrogen, phosphorus and potassium as well as organic matter. The process used to produce the pellets renders the product free of weed seeds and pests, but retains organic matter and nutrient content. The pelleting process also reduces the overall moisture content of the final product, thereby reducing transportation costs. The final pellets can be applied using conventional fertilizer application equipment, which improves handling logistics.

The purpose of this research project was to determine whether the use of Earth Renew OM Plus could partially replace the nitrogen requirements for a processing potato crop. Various rates of Earth Renew OM Plus were used to top up background nitrogen on potatoes and yields were compared with a check plot and a plot fertilized to simulate grower standard practice.

II. Project Objective

- **To evaluate yield and quality of Russet Burbank potatoes grown on soil amended with various rates of Earth Renew OM Plus.** Earth Renew OM Plus was incorporated into soil prior to planting Russet Burbank potatoes. Several rates of OM Plus on sub-optimal nitrogen were compared to optimal nitrogen fertilization and a check. Potatoes were evaluated for yield, grade, specific gravity and defects.

III. Materials and Methods

The study was conducted with Russet Burbank potatoes in replicated plots at the Crop Diversification Centre South in Brooks, AB. Base fertility (135 lbs/ac N) was identical for all treatments and was achieved through a combination of soil fertility and pre-plant incorporation of fertilizer (96 lbs/ac of 11-51-10). Eptam (2.2 L/ac) and Sencor 75DF (150 g/ac) were applied pre-plant (May 7) to control weeds. Russet Burbank (E3 seed) seed was cut (70 – 85g), suberized, treated with fungicide (Maxim MZ PSP, 5 g/kg seed) and planted 30cm apart in 6m rows spaced 0.9m apart. Each treatment was replicated four times in randomized complete block design.

Treatments were applied May 14 – 16 as follows:

1. Check – background fertility only (approximately 135 lbs/ac N)
2. 5 lbs/ac N, 25 lbs/ac P + OM Plus (1 mt/ac) incorporated pre-plant.
3. 5 lbs/ac N, 25 lbs/ac P + OM Plus (2 mt/ac) incorporated pre-plant.
4. 5 lbs/ac N, 25 lbs/ac P + OM Plus (3 mt/ac) incorporated pre-plant.
5. 0 lbs/ac N, 0 lbs/ac P + OM Plus (3 mt/ac) incorporated pre-plant.
6. Growers Standard Practice (GSP) - 62 lbs/ac N, 30 lbs/ac P incorporated pre-plant + 50 lbs/ac N top-dressed at hilling

Potatoes were planted May 22, 2008 approximately 5 to 5½" deep using a two-row wheel planter. Each treatment was 4 rows wide, and the center two rows were harvested (see plot plan attached). Treatment 6 was top-dressed with urea (45-0-0) just prior to hilling all treatments May 29. The plots were irrigated to maintain soil moisture close to 70%. Foliar fungicides were applied several times during the growing season to prevent early and late blight from developing (Table 1). Insecticide was applied July 7 (Thionex EC, 60 mL/ac) to control Colorado potato beetle.

Table 1: Foliar fungicides applied to the potato crop to prevent early and late blight development.

Date of Application	Fungicide	Rate
July 7	Quadris	324 mL/ac
July 23	Dithane DG Rainshield	0.70 kg/ac
August 20	Ridomil Gold/Bravo	8.83 L/10 ac

The trial was desiccated with Reglone (1.4 L/ac) September 12. The two centre rows of potatoes were harvested mechanically September 30. Once harvested, tubers were weighed for total yield estimates, and graded into size categories (<4 oz., 4 to 6 oz., 6 to 10 oz., >10 oz. and deformed tubers). Yield estimates are presented in ton/ac although small plot trials do not always accurately reflect commercial yield potential. A sample of 25 marketable tubers was washed and used to determine specific gravity by the weight in air over weight in water method. Each of these tubers was then cut longitudinally to assess internal defects.

The trial should be conducted for two additional years to allow for differences in environmental conditions between years.

The data presented here have been statistically analyzed using GLM and Duncan's Multiple Range Test; ($p \leq 0.05$). Statistical summaries are available upon request.

IV. Results and Discussion

Yield data is shown in Table 2. Total yield and marketable yield increased with the volume of OM Plus applied relative to the check. Each ton of OM Plus was expected to provide 45 lbs/ac of N and 35 lbs/ac P over the growing season. The 3 T/ac alone treatment resulted in the highest total and marketable yield and was comparable to the GSP (split urea) application. The GSP treatment resulted in the highest number of tubers and the 3 T/ac treatment of OM Plus resulted in the highest number of marketable tubers. Treatments 4 and 5 yielded statistically different results for total and marketable yield, but not for tuber numbers or specific gravity. From these results, it appears that the extra fertilizer applied to provide P to the potatoes reduced average tuber size and was possibly detrimental.

Specific gravity is an indication of potential French fry color for processing potatoes. The specific gravity of all samples except the GSP were in an acceptable range. The GSP treatment resulted in slightly lower specific gravity and may be an indication that slightly too much N was applied for this treatment (Waterer and Heard, 2003).

Table 2: Harvest data including total yield, marketable yield, total tuber number, number of marketable tubers, and specific gravity of Russet Burbank tubers harvested from the check and the OM Plus treated rows. Numbers followed by the same letter in each column are not significantly different from one another at the $p \leq 0.05$ level.

Trt #	Treatments	Total Yield (ton/ac)	Marketable Yield (ton/ac)	Total No. of Tubers	No. of Mkt. Tubers	Specific Gravity
1	Check	30.7 b	27.2 b	179.4 b	129.6 b	1.087 a
2	1T OM Plus + P	31.0 b	27.3 b	189.4 ab	135.9 ab	1.085 ab
3	2T OM Plus + P	31.8 ab	28.5 ab	182.3 b	135.6 ab	1.086 a
4	3T OM Plus + P	31.6 b	27.6 b	193.3 ab	134.0 ab	1.084 ab
5	3T OM Plus	34.3 a	30.9 a	192.5 ab	146.0 a	1.086 a
6	GSP (split urea)	32.8 ab	28.3 ab	205.3 a	138.6 ab	1.082 b

Size distribution data is shown in Table 3. There were some significant differences in the yield of tubers in the cull (< 4 oz.) and medium (4 to 6 oz.) categories between treatments, but no significant differences were observed in yield categories for tubers 6 oz. and up.

Table 3: Size distribution data including yield of Russet Burbank tubers under 4 oz., 4 to 6 oz., 6 to 10 oz., and over 10 oz. harvested from the check and the OM Plus treated rows. Numbers followed by the same letter in each column are not significantly different from one another at the $p \leq 0.05$ level.

Trt #	Treatments	< 4 oz. Yield (ton/ac)	4 to 6 oz. Yield (ton/ac)	6 to 10 oz. Yield (ton/ac)	> 10 oz. Yield (ton/ac)
1	Check	3.0 b	4.7 ab	9.3 a	13.2 a
2	1T OM Plus + P	3.2 ab	5.3 a	9.7 a	12.3 a
3	2T OM Plus + P	2.8 b	4.1 b	11.1 a	13.3 a
4	3T OM Plus + P	3.5 ab	4.6 ab	9.9 a	13.2 a
5	3T OM Plus	2.8 b	4.8 ab	11.1 a	15.1 a
6	GSP (split urea)	3.9 a	5.1 ab	10.2 a	12.9 a

Few deformities were observed in this trial. No significant differences were observed in tuber quality parameters between the OM Plus treatments and the check (internal discoloration, hollow heart, common scab and black scurf). There was no evidence of phytotoxicty or other non-safety adverse effects with the use of OM Plus during this study.

V. Conclusions

In this trial, Earth Renew OM Plus was able to effectively replace some of the N required to produce Russet Burbank potatoes for processing. The 1 T/ac treatment was not significantly better than the check where only background fertility was available in the field. The 2 T/ac and 3 T/ac treatments provided results similar to those in a simulated grower standard practice (GSP) treatment. The 3 T/ac treatment resulted in the highest total and marketable yield with specific gravity in a desirable range. When sufficient Earth Renew was applied to compensate for N

requirements, additional P was not required and may have been detrimental. The background level of fertility in the 2008 research plots was intended to be sub-optimal, and even greater differences may have been observed on N-poor soil. This trial did not attempt to measure improvements to soil organic matter or future N potential of the soil. The trial should be conducted for two to three consecutive years to allow for differences in environmental conditions between years.

VI. References

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