



2017 DELTA FERTILIZER TRIALS POTATOES – REDUCED PHOSPHORUS FIELD SPECIFIC RESULTS

FIELD A: REPLICATED TRIAL (REDS)

Soil Details

Samples taken pre-trial, in May 2017. Samples taken at 0-15 cm depth. P and K ratings specific to potatoes in the Lower Mainland, developed by BC AGRI.

Field	pH	OM (%)	Kelowna P (ppm)	P-rating	Kelowna K (ppm)	K-rating
A	5.5	4.6	174	Very High	242	High

Fertilizer Treatments

Field	Fertilizer Treatment	Total Applied N lb/acre	Total Applied P ₂ O ₅ lb/acre	Total Applied K ₂ O lb/acre	Fertilizer Rates and Application Methods
A	Farm rate	74	115	184	450 lb/ac broadcast (12-5-23) 400 lb/ac in-furrow (5-23-20)
	Reduced rate	74	62	180	450 lb/ac broadcast (12-5-23) 400 lb/ac in-furrow (5-9.7-19)

Planting Date

June 3, 2017

Harvest Date

September 12, 2017

Trial Size

Three plots per treatment, each plot 24 ft (8 rows) by 400 ft

Field A - Results

Mean total yield was lower under Farm rate compared with Reduced rate treatment (Fig. 1). There were no differences between treatments for foliar N, P, K or post-harvest soil nitrate, P, K (results not shown). Fertilizer application method did not differ between treatments. The cause of higher yield under reduced P fertilizer in this field is unclear, possibly due to a variable not measured in this trial.

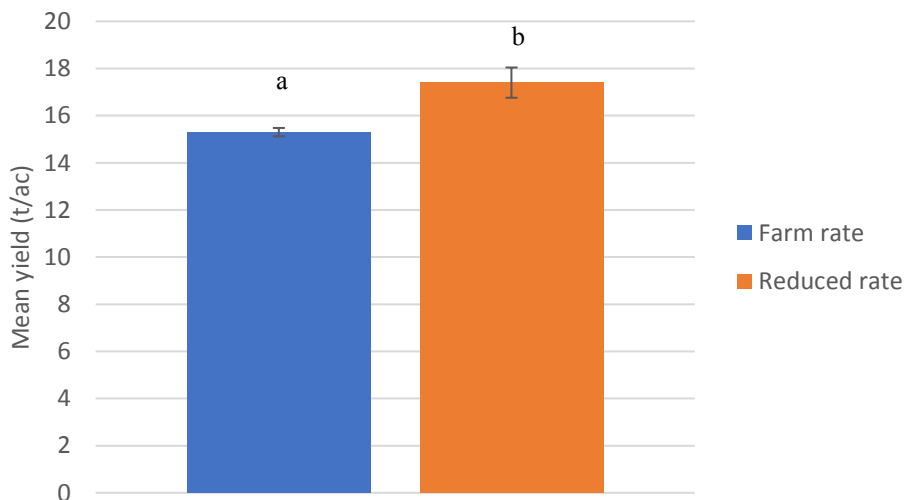


Figure 1. Mean potato yield (t/ac) under Farm rate and Reduced rate fertilization treatments for Field A. Error bars represent standard error of the mean (n = 3). Bars with the same letter are not significantly different ($P < 0.05$).

FIELD B: REPLICATED TRIAL (YELLOWIS)

Soil Details

Samples taken pre-trial, in June 2017. Samples taken at 0-15 cm depth. P and K ratings specific to potatoes in the Lower Mainland, developed by BC AGRI.

Field	pH	OM (%)	Kelowna P (ppm)	P-rating	Kelowna K (ppm)	K-rating
B	5.6	6.4	163	Very High	220	High

Fertilizer Treatments

Field	Fertilizer Treatment	Total Applied N lb/acre	Total Applied P ₂ O ₅ lb/acre	Total Applied K ₂ O lb/acre	Fertilizer Rates and Application Methods
B	Farm rate	80	180	220	1000 lb/ac in-furrow (8-18-22)
	Reduced rate	80	90	220	1000 lb/ac broadcast (8-9-22)

Planting Date

June 20, 2017

Harvest Date

September 21, 2017

Trial Size

Three plots per treatment, each plot 24 ft (8 rows) by 200 ft

Field B - Results

There was no significant difference in mean total yield under Reduced rate vs. Farm rate (Fig. 2). There was greater variation in yield under the Reduced treatment, which was applied via broadcasting, and may be due to inefficient delivery of fertilizer nutrients that are relatively immobile in soil solution, such as P. There were no differences between treatments for foliar N, P, K or post-harvest soil nitrate, P, K. Total yield by weight was relatively low overall and there were foliar deficiencies in manganese, magnesium, sulfur, and boron in this field for both treatments, indicating generally limiting growing conditions. Plants also showed some signs of water stress.

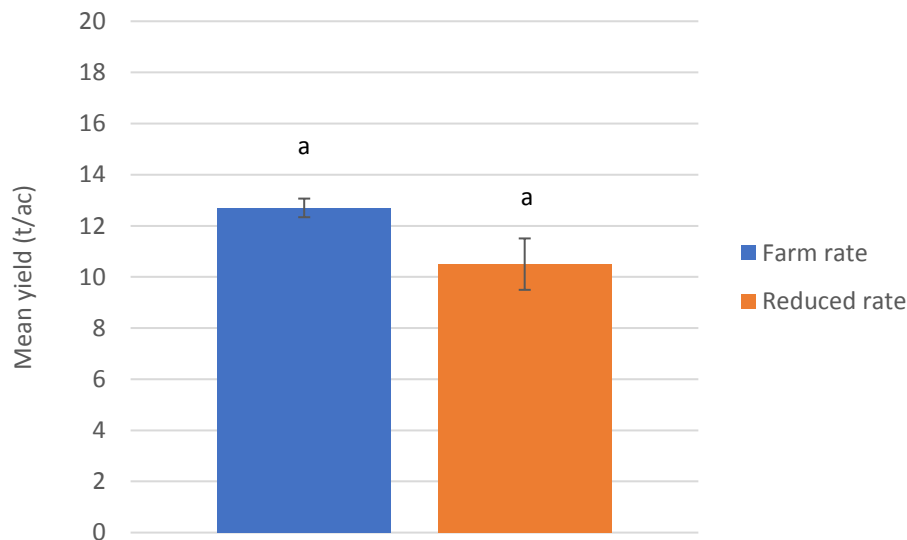


Figure 2. Mean potato yield (t/ac) under Farm rate and Reduced rate fertilization treatments for Field B. Error bars represent standard error of the mean (n = 3). Bars with the same letter are not significantly different ($P < 0.05$).

UNREPLICATED TRIALS: FIELD C (WHITES)**FIELD D (YELLOWWS)****FIELD E (REDS)****Soil Details**

Samples taken pre-trial, between April and June 2017. Samples taken at 0-15 cm depth. P and K ratings specific to potatoes in the Lower Mainland, developed by BC AGRI.

Field	pH	OM (%)	Kelowna P (ppm)	P-rating	Kelowna K (ppm)	K-rating
C	4.7	5.4	318	Very High	352	Very High
D	5.1	4.1	67	High	127	Medium
E	5.7	4.4	179	Very High	281	Very High

Fertilizer Treatments

Field	Fertilizer Treatment	Total Applied N lb/ac	Total Applied P ₂ O ₅ lb/acre	Total Applied K ₂ O lb/acre	Fertilizer Rates & Application Methods
C	Farm rate	88	198	242	1100 lb/ac in-furrow (8-18-22)
	Reduced rate	88	99	242	1100 lb/ac in-furrow (8-9-22)
D	Farm rate	195	144	216	300 lb/ac broadcast (26-0-12) 900 lb/ac in-furrow (13-16-20)
	Reduced rate	158	90	256	300 lb/ac broadcast (26-0-12) 1000 lb/ac broadcast (8-9-22)
E Trial 1	Farm rate	88	198	242	550 lb/ac broadcast (8-18-22) 550 lb/ac in-furrow (8-18-22)
	Reduced rate	101	105	271	550 lb/ac broadcast (8-18-22) 715 lb/ac in-furrow (8-0.9-21)
E Trial 2	Farm rate	88	198	242	550 lb/ac broadcast (8-18-22) 550 lb/ac in-furrow (8-18-22)
	Reduced rate	101	105	271	550 lb/ac broadcast (8-18-22) 715 lb/ac in-furrow (8-0.9-21)
E Trial 3	Farm rate	88	198	242	550 lb/ac broadcast (8-18-22) 550 lb/ac in-furrow (8-18-22)
	Reduced rate	88	149	242	550 lb/ac broadcast (8-18-22) 550 lb/ac in-furrow (8-9-22)

Field C**Planting Date**

June 12, 2017

Harvest Date

September 26, 2017

Trial Size

One plot per treatment, each plot 48 ft 16 rows) by 400 ft

Field D**Planting Date**

June 7, 2017

Harvest Date

September 14, 2017

Trial Size

One plot per treatment, each plot 24 ft (8 rows) by 300 ft

Field E**Planting Date**

June 14, 2017

Harvest Date

September 26, 2017

Trial Size

Field contained three separate trial areas

One plot per treatment, each plot 12 ft (4 rows) by 200 ft

Fields C - Results

The two fertilizer treatments had similar yields in Field C with overlap of subsample yields between treatments (Fig. 3). The Reduced rate plot had a higher mean total yield compared to the Farm rate plot. The range in yield was similar in size for both treatments. Foliar samples showed calcium and magnesium deficiency concerns throughout both fertilizer treatment plots. Foliar and post-harvest soil sampling showed similar nitrate, P, and K values between treatments.

Fields D - Results

The two fertilizer treatments also had similar yields in Field D with overlap of subsample yields between treatments (Fig. 3). The Reduced rate plot had a higher mean total yield compared to the Farm rate plot, and the range of yield was similar under both fertilizer treatments. The difference in fertilizer application method per treatment (broadcasted Reduced rate vs. in-furrow Farm rate) did not appear to result in any yield differences. Relative to the other unreplicated fields, Field D had the widest range from maximum yield to minimum yield in each plot. Foliar samples showed calcium and boron deficiency concerns throughout both fertilizer treatment plots. Foliar and post-harvest soil sampling showed similar nitrate, P, and K values between treatments. Field D had higher N fertilizer rates and some of the highest post-harvest nitrate values (around 100 kg/ha) relative to all other fields

Fields E - Results

The overall distribution of yield data appeared similar between fertilizer treatments in all three trials in Field E (Fig. 4). In Trials E1 and E2, there was a wider overall range of yield under Reduced rate, with the Reduced rate plots containing both the highest yielding and the lowest yielding subsamples in those trials. Foliar samples showed magnesium deficiency concerns throughout all plots. Post-harvest soil samples showed slightly higher nitrate under Reduced rate in Trials E1 and E2 relative to all other plots and treatments in Field E, which matches the higher nitrogen fertilizer applications in these plots. The yield data from the Farm rate plots of the three separate trials provide a valuable example of within-field yield variability, as the treatments for these plots are technically the same and yet Farm rate plot yields range from 15.7 t/ac to 20.3 t/ac depending on the plot location within the field. Foliar nitrate and foliar and post-harvest P and K were similar between treatments.

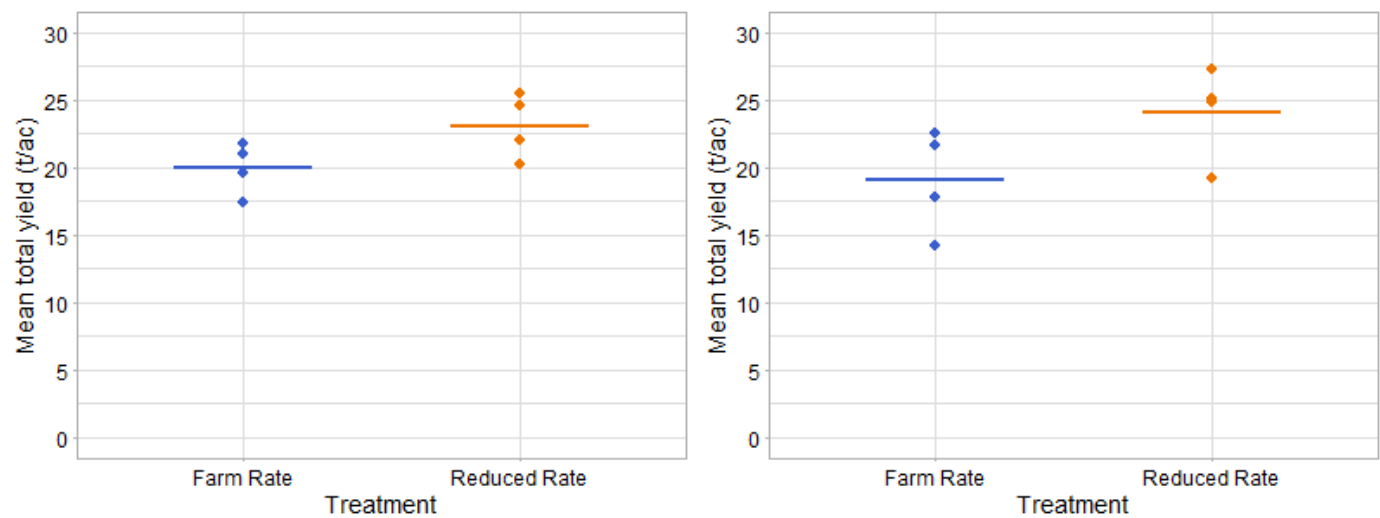


Figure 3. Total potato yield (t/ac) under Farm rate and Reduced rate fertilization treatments for unreplicated Fields C (left) and D (right). Points represent the yield at each of the four subsamples within each trial plot, with lines indicating the mean value of subsamples.

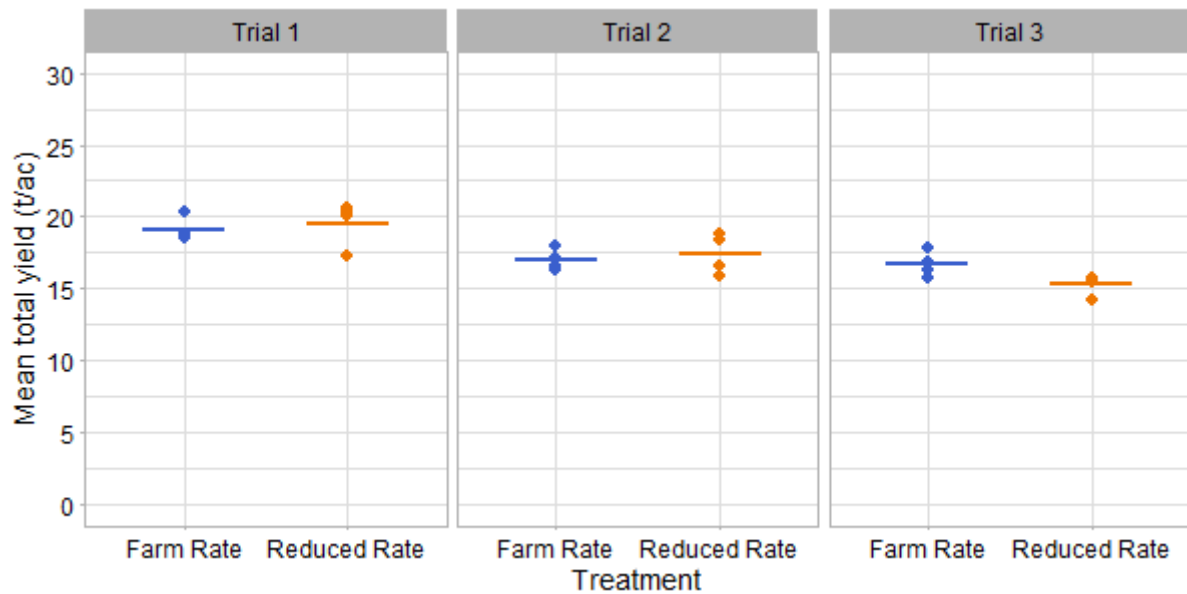


Figure 4. Total potato yield (t/ac) under Farm rate and Reduced rate fertilization treatments for three unreplicated trial areas in Field E. Points represent the yield at each of the four subsamples within each trial plot, with lines indicating mean value of subsamples.