Background
Outside of Integrated Pest Management, little supporting research is available locally to support pea growers in achieving higher crop yields. There is a gap in knowledge on the topic of soil management, crop nutrition, and the impacts of extreme weather on crop yields.

Objective
The Pea Accelerator Challenge set out to systematically survey and collect key field, soil, weather, crop, and crop production data in order to identify trends that may exist in high and/or low yielding peas.

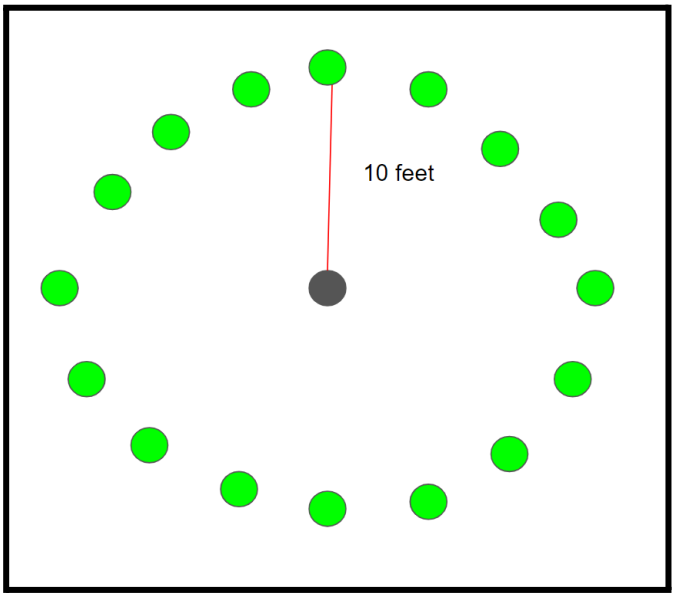
Materials & Methods
Following the conclusion of this project the previous crop season, 3 fields, evenly distributed across the pea growing regions, were selected for inclusion in the project. Twenty (20) sub-sites were chosen from each field and used as sample locations, based on known historical yield variability, soil type differences, or other factors deemed appropriate, in consultation with the growers.

The following information was collected:

- Soil chemistry (i.e. CEC, pH, macro and micro nutrients)
- Soil properties (soil type, water holding capacity, bulk density, total organic carbon)
- 3 X plant tissue analysis throughout the season @ 4-node, 10% bloom, and at harvest

Soil Samples Collection
Each sub-site at each location was soil sampled prior to fertilizer application and crop planting.

1. Each sub-site location was GPS located and stored for future reference
2. 10-12 soil cores were taken within a 10’ radius of the centre of the subsite at a 6” depth. All cores are mixed in a plastic pail and submissions bags are filled



Tissue Samples Collection

Each sub-site at each location was tissue sampled at 3 key crop stages: 4-node, 10% bloom, immediately prior to harvest

4-node = when 4 nodes have fully expanded leaves
10% bloom = when 10% of plants have at least 1 open flower
Prior to harvest = immediately prior to harvest sample collection

Harvest

Each sub-site at each location was manually harvested in order to collect yield information. 4 to 6 rows X 6' (feet) in length were harvested and processed using the standard pea pregrading processes in order to capture yield and tenderometer information.

Results

Across the fields included in this study, significant variability in geography, planting dates, harvest dates, and weather conditions existed. As such, data has been analyzed on a field-by-field basis by looking for trends across sample sub-sites within each field.

Site 1

Strongest yields at this site appear to be correlated with areas in the field where base saturation of potassium (K) and magnesium (Mg) are well balanced, meaning 3-5% base saturation K and 15-20% base saturation Mg. When early season tissue sampling was conducted at the 4-node stage, these well balanced areas of the field also produced tissue sample results with the highest plant uptake of K and Mg. There were no noticeable trends linking yield and crop nutrient levels when bloom and harvest tissue sample results are evaluated.

Site 1: Yield by Soil %K and %Mg

Yield Index (within Field)	% K	Yield Index (within Field)	% Mg
119%	2.0	119%	16.8
119%	6.3	119%	14.5
116%	4.2	116%	19.5
115%	1.2	115%	9.8
114%	6.9	114%	14.2
114%	2.0	114%	16.3
110%	4.6	110%	15.1
108%	2.5	108%	21.2
105%	5.5	105%	10.8
99%	1.6	99%	12.5
99%	1.7	99%	10.6
94%	1.5	94%	11.8
94%	1.7	94%	14.1
93%	1.4	93%	13.8
89%	0.9	89%	8.8
88%	1.2	88%	8.6
87%	1.6	87%	8.1
82%	1.4	82%	12.6
77%	1.8	77%	14.7
76%	4.6	76%	20.8

Site 1: Tissue K and Mg levels at the 4-node tissue sample timing

Yield Index (within Field)	K%	Yield Index (within Field)	Mg%
119%	3.01	119%	0.29
119%	3.43	119%	0.37
116%	3.48	116%	0.35
115%	2.79	115%	0.27
114%	3.76	114%	0.31
114%	2.84	114%	0.26
110%	3.82	110%	0.37
108%	2.40	108%	0.30
105%	3.14	105%	0.37
99%	3.36	99%	0.25
99%	3.16	99%	0.25
94%	3.10	94%	0.26
94%	2.68	94%	0.28
93%	3.20	93%	0.25
89%	3.00	89%	0.25
88%	2.80	88%	0.24
87%	3.08	87%	0.20
82%	2.44	82%	0.25
77%	2.27	77%	0.28
76%	3.20	76%	0.34

Site 2

Data resulting from the evaluations at the second site cannot be properly evaluated due to the highly variable spread of fusarium wilt throughout the field (see pictures below). Numerous areas of the field, primarily lower lying areas, were impacted early in the season, with symptoms becoming severe by the bloom stage of the crop. It is worth noting however, that tissue sample data collected during the bloom stage shows significantly higher nutrient concentrations where the crop was healthy and ended up yielding more at harvest. This is to be expected as fusarium wilt is due to the deciccation of plant roots, which will limit the plants ability to take up water and nutrients from the soil.

	TISSUE TEST RESULTS								
	10% BLOOM TISSUE ANALYSIS								
	2.99	0.28	2.00	0.08	0.30	1.20	25.00	25.00	5.00
	3.99	0.38	3.50	0.16	0.70	2.00	400.00	400.00	60.00
Yield Index (within Field)	N%	P%	K%	S%	Mg%	Ca%	Zn ppm	Mn ppm	B ppm
136%	3.87	0.32	3.04	0.17	0.26	0.81	23.00	29.00	13.50
132%	3.33	0.38	1.92	0.16	0.20	1.26	22.00	32.00	14.80
126%	3.36	0.30	1.97	0.16	0.21	1.39	17.00	22.00	12.50
123%	3.26	0.33	2.12	0.15	0.19	1.04	21.00	26.00	12.70
122%	3.84	0.39	2.23	0.18	0.20	1.13	21.00	18.00	14.50
122%	3.38	0.39	2.45	0.17	0.19	1.37	18.00	22.00	13.20
122%	4.43	0.48	2.54	0.20	0.23	0.91	19.00	18.00	12.90
116%	2.61	0.29	1.96	0.15	0.20	0.91	21.00	16.00	14.30
113%	3.06	0.32	2.59	0.16	0.19	1.13	32.00	35.00	16.30
104%	2.82	0.29	1.49	0.14	0.20	1.19	17.00	15.00	11.00
98%	3.10	0.35	2.26	0.16	0.18	1.14	19.00	18.00	15.60
96%	2.51	0.30	1.48	0.15	0.17	1.24	16.00	20.00	13.40
94%	2.21	0.25	1.40	0.13	0.17	0.91	22.00	16.00	15.10
93%	2.54	0.27	1.48	0.14	0.23	1.26	19.00	14.00	17.50
89%	1.86	0.19	1.13	0.12	0.16	0.96	13.00	27.00	11.80
86%	2.77	0.26	1.60	0.13	0.36	1.13	15.00	22.00	11.30
69%	2.94	0.36	1.74	0.16	0.20	1.22	21.00	17.00	15.60
58%	2.05	0.22	1.21	0.14	0.18	1.02	14.00	24.00	14.90
54%	2.18	0.21	1.32	0.14	0.15	1.08	11.00	22.00	11.00
46%	2.05	0.26	1.02	0.13	0.15	1.15	17.00	23.00	13.50

Site 3

Data from the third site showed similar trends at the first site, even though harvest was separated by nearly one month and the fields are a significant distance apart from each other. Higher yielding areas of this field tended to come from areas with the most balanced base saturation. This is also the only field in the study where plant tissue levels of various micronutrients also seemed to correlate with higher yield, namely zinc, manganese, and boron. It is also worth noting that this field has some higher pH soil, and higher yields tend to be associated with pH values less than 7.

Yield Index (within Field)	Soil pH	Mg ppm	%K	%Mg	%Ca
120%	7.5	171	2.3	11.0	86.3
118%	7.0	244	2.6	12.9	84.1
112%	6.8	211	3.0	14.8	81.7
109%	7.0	213	2.0	11.8	85.8
108%	6.8	216	5.8	13.5	80.2
105%	6.1	163	3.9	15.7	79.8
104%	6.6	257	4.4	14.7	80.4
103%	6.1	248	2.2	12.9	67.8
102%	7.7	166	2.2	9.1	88.3
102%	7.2	201	2.3	13.8	83.4
101%	7.8	139	1.8	6.5	91.4
101%	7.5	233	2.1	13.0	84.5
100%	7.6	166	2.1	8.2	89.3
99%	7.8	117	1.8	4.9	92.9
96%	7.9	140	1.6	5.3	92.8
95%	7.8	118	1.4	5.7	92.6
93%	7.6	128	1.5	7.1	91.0
90%	7.3	215	2.2	14.0	83.4
76%	7.8	166	1.7	6.1	91.9
65%	7.6	103	2.4	5.5	91.7

Yield Index (within Field)	Zn ppm	Mn ppm	B ppm
120%	38.00	26.00	14.60
118%	38.00	23.00	14.60
112%	41.00	23.00	15.70
109%	39.00	26.00	16.20
108%	40.00	27.00	16.90
105%	41.00	26.00	15.60
104%	46.00	27.00	17.20
103%	45.00	24.00	20.20
102%	34.00	23.00	14.50
102%	31.00	20.00	12.00
101%	40.00	23.00	13.90
101%	41.00	26.00	15.70
100%	34.00	19.00	13.70
99%	37.00	21.00	12.80
96%	40.00	20.00	13.70
95%	41.00	27.00	13.80
93%	33.00	23.00	12.10
90%	35.00	25.00	10.20
76%	38.00	23.00	14.80
65%	37.00	28.00	10.90