

Table 1. Average increase in pea yield and protein concentration due to rhizobia inoculation and N fertilizer application in 58 trials conducted across a wide geographic area of Alberta, Canada.

Trial Code	Legume history	Soil NO ₃ -N to 30 cm (kg ha ⁻¹)	Mean Seed Yield (kg ha ⁻¹)	Yield Response to Inoculation (% increase)	N Fertilizer ^x (% increase)	Protein Conc. (g kg ⁻¹)	Protein Response to Inoculation (% increase)	N Fertilizer (% increase)
Dark Brown Soil Zone								
Barons 95	No	7	2854	3.8 ^{PCy}	9.7 ^{**}	19.0	0.9 ^{PC}	4.1 ^{**}
Strathmore 95	No	29	5691	-4.4 ^{PC}	-0.1	19.0	-1.9 ^{PC}	-0.6
Chin 96	No	15	2331	3.2 ^{PC}	17.6 ^{**}	17.2	3.9 ^{PC}	1.0
Claresholm 96	No	6	3697	18.9 ^{PC}	11.0 ^{**}	19.7	3.8 ^{PC}	-1.0 [*]
Strathmore 96	No	3	5488	-3.3 ^{PC}	1.0	21.3	0.0 ^{PC}	-0.1
Claresholm 97	No	22	3013	13.5 ^{**}	-6.4	21.3	7.1 ^{**}	0.6
Wilson 98	No	7	4403	39.8 ^{**}	0.5	19.9	8.6 ^{**}	-0.9
Thin Black Soil Zone								
Beiseker 95	No	24	3769	-16.5 ^{PC}	-14.2 ^{**}	18.4	-5.8 ^{PC}	-3.4 ^{**}
High River 95	No	24	4600	-3.6 ^{PC}	8.0	16.9	-3.8 ^{PC}	1.0
Irricana 95	No	40	2166	-3.2 ^{PC}	4.5	17.3	-4.0 ^{PC}	-6.3 ^{**}
Pincher Creek 95	No	71	3451	-5.2 ^{PC}	20.0 ^{**}	20.0	-3.9 ^{PC}	0.0
Beiseker 96	No	15	4674	0.8 ^{PC}	3.0	22.1	-0.7 ^{PC}	0.7 ^{**}
High River 96	No	12	4016	2.5 ^{PC}	0.3	20.3	0.4 ^{PC}	-0.8
Irricana 96	No	40	3636	7.9 ^{PC}	-1.1	19.5	2.4 ^{PC}	-3.0 ^{**}
Pincher Creek 96	No	20	2397	-3.8 ^{PC}	2.4	21.7	-0.2 ^{PC}	1.1 ^{**}
Beiseker 97	No	23	4713	-1.7	3.0	21.9	2.2	-1.1
High River 97	No	24	3747	11.5 ^{**}	7.7 ^{**}	20.3	3.5 ^{**}	-1.4
Irricana 97	No	15	4561	1.2	3.8 [*]	21.3	0.7 [*]	0.8 ^{**}
Beiseker 98	No	24	3563	-2.5	7.2 ^{**}	21.1	-0.3	0.6
Irricana 98	No	34	3855	9.0 ^{**}	-3.1	19.9	5.2 ^{**}	-2.8 ^{**}
Black Soil Zone								
Ellerslie 95	No	104	4556	0.9 ^{PC}	2.7	19.0	-0.7 ^{PC}	-0.6
Lacombe 95	Unknown	NDz	3736	-7.8 ^{PC}	1.6	20.5	0.6 ^{PC}	0.8
Olds 95	Yes	68	3997	1.8 ^{PC}	8.2	22.6	-0.8 ^{PC}	-0.5
Red Deer 95	No	57	5632	-0.1 ^{PC}	5.2 ^{**}	18.1	-7.4 ^{PC}	0.6
Vegreville 95	No	20	4116	-4.4 ^{PC}	4.2	21.4	-1.4 ^{PC}	-1.5 [*]
Viking 95	No	117	3199	-5.4 ^{PC}	4.5	21.0	0.0 ^{PC}	2.1 ^{**}
Ellerslie 96	No	42	6753	-1.0 ^{PC}	1.0	21.3	-0.7 ^{PC}	0.4
Olds 96	No	42	5522	1.2 ^{PC}	1.1	22.1	0.0 ^{PC}	0.6
Ponoka 96	No	77	5642	9.8 ^{PC}	3.5	24.6	-3.4 ^{PC}	-0.7
Red Deer 96	Yes	26	2169	-1.1 ^{PC}	-7.5	20.9	1.3 ^{PC}	-3.1 ^{**}
Ryley 96	No	ND	2477	0.6 ^{PC}	-2.4	21.8	-0.8 ^{PC}	2.3 ^{**}
Ellerslie 97	No	24	4999	-2.6	-1.3	21.4	-2.1 ^{**}	0.1
Olds 97	No	33	6688	-0.8	-2.9	20.9	2.1	-0.5
Red Deer 97	Yes	18	5779	-7.2	-3.0	20.1	2.7 [*]	-0.3
Vegreville 97	Yes	71	3895	5.5 ^{**}	4.1	20.3	0.3	0.2
Devon 98	No	15	3628	19.0 ^{**}	-4.7 [*]	20.6	3.7 ^{**}	-1.3 ^{**}
Ellerslie 98	No	42	5082	3.4	-2.1	21.4	0.8 [*]	-0.3
Red Deer 98	Yes	31	3437	-0.5	5.4 ^{**}	21.2	0.2	0.5
Vegreville 98	Yes	ND	3047	-0.1	0.8	21.8	-0.3	-1.1 [*]

^z Not determined. ^y Possible cross-contamination of inoculant between treatments. ^x 20, 40 and 60 kg N ha⁻¹ compared to 0 kg N ha⁻¹.

* P<0.05, **P<0.01 (planned F tests).

Table 1. (cont'd) Average increase in pea yield and protein concentration due to rhizobia inoculation and N fertilizer application in 58 trials conducted across a wide geographic area of Alberta, Canada.

Trial Code	Legume history	Soil NO ₃ -N to 30 cm (kg ha ⁻¹)	Mean Seed Yield (kg ha ⁻¹)	Yield Response to Inoculation (% increase)	N Fertilizer ^x (% increase)	Protein Conc. (g kg ⁻¹)	Protein Response to Inoculation (% increase)	N Fertilizer (% increase)
<i>Gray Soil Zone</i>								
Barrhead 95	Unknown	77	3709	-0.9 ^{PC}	11.2 ^{**}	22.3	0.0 ^{PC}	-0.9
Beaverlodge 95	No	106	7631	0.1 ^{PC}	-0.6	20.2	0.3 ^{PC}	0.4
Fahler 95	Unknown	25	5073	-12.5 ^{PC}	1.2	17.6	-8.0 ^{PC}	-2.5 ^{**}
Grimshaw 95	Unknown	41	2087	-0.8 ^{PC}	-1.5	18.3	-0.6 ^{PC}	-0.8
Barrhead 96	Unknown	31	4752	0.3 ^{PC}	4.5 ^{**}	20.9	-1.3 ^{PC}	1.2 [*]
Beaverlodge 96	No	26	1994	14.7 ^{PC}	1.7	20.9	-0.5 ^{PC}	0.4
Fairview 96	Unknown	30	2972	-0.8 ^{PC}	-3.1	20.6	0.1 ^{PC}	0.4
Rycroft 96	Unknown	53	1791	-3.4 ^{PC}	1.0	18.7	1.2 ^{PC}	-2.9 ^{**}
Fairview 97	Unknown	52	3059	21.2 ^{**}	10.3 ^{**}	21.2	-0.5	0.3
Wanham 97	Unknown	44	3829	-4.1	2.9	20.9	0.3	0.1
Fairview 98	Unknown	31	763	-4.2	-3.2	19.0	6.7 ^{**}	-3.2 ^{**}
<i>Irrigated trials, Brown and Dark Brown Soil Zones</i>								
Bow Island 95	Yes	43	6613	-4.5 ^{PC}	-1.0	20.1	-1.4 ^{PC}	1.8
Bow Island 96	Yes	22	5202	-2.1 ^{PC}	3.0	20.1	0.2 ^{PC}	0.1
Lethbridge 96	Yes	97	5530	3.4 ^{PC}	5.0	21.0	0.3 ^{PC}	2.0 [*]
Picture Butte 96	Yes	40	5532	2.7 ^{PC}	-0.7	17.7	-2.5 ^{PC}	0.4
Bow Island 97	Yes	62	5229	-0.5	0.9	20.6	0.8	-0.1
Lethbridge 97	Yes	75	5967	5.0 [*]	6.6 ^{**}	19.0	0.7	2.0 ^{**}
Bow Island 98	Yes	40	4409	4.7 [*]	3.4	21.4	-0.8 [*]	0.9
Lethbridge 98	Yes	31	5299	0.2	2.8	19.0	0.0	0.6

^z Not determined. ^y Possible cross-contamination of inoculant between treatments. ^x 20, 40 and 60 kg N ha⁻¹ compared to 0 kg N ha⁻¹.

* P<0.05, **P<0.01 (planned F tests).