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# 1975 Part 1 - Rates and times of potassium applications on lupins cv Unicrop

W.J. Cox

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SUMMARY OF RESULTS

1975

W. J. COX

PART I : RATE AND TIME OF POTASSIUM APPLICATION ON LUPINS  
cv. UNICROP, K. McQUEEN, ENEABBA. 75TS1/1616EX

75TS1/1616EX RATES AND TIMES OF POTASSIUM APPLICATION ON LUPINS,  
K. McQUEEN, ENEABBA.

Soil type Grey sand over yellow sand at 50-60 cm.

Original Blackbutt, banksia.  
vegetation

History Cleared 1969. Clover seeded 1971, wheat 1973.  
Clover harvested in 1972. 360 kg/ha super Cu Zn  
No. 2 in 1971. 200 kg/ha plain super 1972, 1973 and  
1974.

Seeded May 15, 1975 at 95 kg/ha Unicrop. Weed control  
good. Insect damage negligible. Harvested November  
7, 1975.

## RESULTS

### I. SOIL ANALYSIS

Collected twenty 5 cm diameter cores/rep and depth on April 21, 1975.  
The samples were bulked, mixed, subsampled, airdried, and passed  
through a 2 mm sieve. The < 2 mm fraction was analysed for para-  
meters tabulated below.

Sample	Depth	Total k	HNO <sub>3</sub> k	0.5 M N HCO <sub>3</sub> k	Exchangeable				CEC	%C	%N	Sand	Silt	Clay	pH	
					k	Ca	Mg	Na								H
	cm	ppm	ppm	ppm							%	%	%			
Rep 1	0-10	2000	57	16	<0.05	1.2	0.1	<0.05	0.1	1.4	.43	.021	98	1	1	6.4
	10-20	2200	57	10	<0.05	0.6	0.1	<0.05	<0.05	0.6	.20	.011	98	1	1	6.3
	20-30	2500	59	7	<0.05	0.3	<0.1	<0.05	<0.05	0.3	.10	.005	98	1	2	6.5
	30-40	2800	74	6	<0.05	0.2	<0.1	<0.05	0.3	0.5	.07	<.005	98	1	1	6.3
Rep 2	0-10	2000	56	13	<0.05	0.8	0.1	<0.05	<0.05	0.8	.36	.017	98	1	2	6.4
	10-20	1800	55	8	<0.05	0.6	0.1	<0.05	<0.05	0.6	.22	.012	99	1	1	6.4
	20-30	2200	55	6	<0.05	0.3	<0.1	<0.05	1.1	1.4	.08	.005	98	1	1	6.4
	30-40	2100	56	7	<0.05	0.4	<0.1	<0.05	<0.05	0.4	.10	.007	99	1	1	6.5
Rep 3	0-10	1500	67	10	<0.05	1.0	0.1	<0.05	0.1	1.2	.36	.018	98	1	1.5	6.3
	10-20	1600	64	2	<0.05	0.8	0.1	<0.05	<0.05	0.9	.30	.016	98	.5	1.5	6.4
	20-30	1600	49	5	<0.05	0.4	<0.1	<0.05	<0.05	0.4	.16	.009	98	.5	2	6.3
	30-40	2000	48	4	<0.05	0.2	<0.1	<0.05	0.3	0.5	.08	.005	98	1	1.5	6.2
Total	0-10	5500	180	39	<.15	3.0	.3	<.15	<.25	3.4	1.15	.056	294	3	4.5	19.1
	10-20	5600	176	26	<.15	2.0	.3	<.15	<.15	2.1	.72	.039	295	2.5	3.5	19.1
	20-30	6300	163	18	<.15	1.0	<.3	<.15	1.20	2.10	.34	.019	294	2.5	5	19.2
	30-40	6900	178	17	<.15	0.8	<.3	<.15	0.65	1.4	.25	.017	295	3	3.5	19.0
Mean	0-10	1830	60	13	<.05	1.00	.1	<.05	.08	1.13	.38	.019	98	1.0	1.5	6.4
	10-20	1870	59	9	<.05	0.67	.1	<.05	<.05	0.70	.24	.013	98	0.8	1.2	6.4
	20-30	2100	54	6	<.05	0.33	<.1	<.05	.40	0.70	.11	.006	98	0.8	1.7	6.4
	30-40	2300	59	6	<.05	0.27	<.1	<.05	.22	0.47	.08	.006	98	1.0	1.2	6.3
Profile	0-15	2200	58	12	<0.05	1.0	0.1	<0.05	.1	1.2	.33	.016	98	1.3	1.2	6.2
	15-30	3000	70	3	<0.05	0.2	<0.1	<0.05	.2	0.4	.08	<.005	98	1.8	1.0	6.0
	30-60	3000	72	5	<0.05	0.2	<0.1	<0.05	.2	0.4	.08	<.005	98	1.5	1.0	5.8
	60-100	3700	87	5	<0.05	0.1	<0.1	<0.05	.1	0.2	<.05	<.005	97	1.5	1.5	6.1

0.5 M Na HCO<sub>3</sub> extractable K is a useful indicator of plant available K and in this trial is very low. Boiling HNO<sub>3</sub> and total potassium are also low.

## Rainfall 1975

	mm
May 15 to end of May	26.75
June	139.5
July	152.5
August	48.0
September	43.8
October	28.5
November	8.0

## II. PLANT COUNTS

Plants/10m of drill row, June 20, 1975

Treatment kg/ha kcl	Rep 1	Rep 2	Rep 3	Total	Mean
Nil	53	61	45	159	53 AB
25 at seeding	64	63	40	167	56 AB
50 " "	63	40	59	162	54 AB
75 " "	62	62	49	173	58 AB
100 " "	52	49	54	155	52 AB
150 " "	48	59	44	151	50 AB
200 " "	54	45	41	140	47 A
300 " "	62	64	41	167	56 AB
Nil	56	48	58	162	54 AB
25 at 4 weeks	59	67	54	180	60 AB
50 " " "	68	68	49	185	62 AB
75 " " "	48	54	48	150	50 AB
100 " " "	55	49	61	165	55 AB
150 " " "	54	65	64	183	61 AB
200 " " "	69	55	58	182	61 AB
300 " " "	51	55	60	166	55 AB
Nil	46	56	53	155	52 AB
25 at 8 weeks	58	70	54	182	61 AB
50 " " "	75	63	58	196	65 B
75 " " "	54	64	51	169	56 AB
100 " " "	47	58	45	150	50 AB
150 " " "	56	46	55	157	52 AB
200 " " "	65	58	57	180	60 AB
300 " " "	63	48	74	185	62 AB

## III. SEASONAL DRY MATTER PRODUCTION g/20 PLANTS

Treatment kg kcl/ha	June 12	July 14	Aug 15	Sept 17	Oct 15	Nov 3
Nil	3.1 ABC	12.9 A	49 A	95 A	112 A	122
25 at seeding	3.7 C	15.0 A	106 B	134 AB	224 AB	115
50 " "	3.2 ABC	16.4 A	127 BCD	188 BCD	290 BC	225
75 " "	2.8 A	14.9 A	128 BCD	188 BCD	330 BCDE	200
100 " "	3.6 BC	13.1 A	130 BCD	263 CDEF	323 BCDE	302
150 " "	3.0 ABC	15.2 A	151 CD	275 EFG	368 CDEFG	287
200 " "	2.9 AB	14.4 A	150 CD	288 EFG	419 DEFG	372
300 " "	3.1 ABC	13.3 A	120 BC	292 EFG	447 EFG	300
Nil	3.1 ABC	14.3 A	66A	87 A	125 A	157
25 at 4 weeks	3.7 C	14.7 A	133 BCD	235 CDE	307 BCD	242
50 " " "	3.2 ABC	14.4 A	122 BC	264 CDEF	349 CDEF	390
75 " " "	2.8 A	15.4 A	129 BCD	271 DEF	372 CDEFG	302
100 " " "	3.6 BC	14.4 A	130 BCD	288 EFG	447 EFG	328
150 " " "	3.0 ABC	15.3 A	119 BC	355 G	488 G	287
200 " " "	2.9 AB	14.8 A	151 CD	338 FG	444 EFG	409
300 " " "	3.1 ABC	14.4 A	166 D	305 EFG	470 FG	391
Nil	3.1 ABC	13.6 A	63 A	85 A	136 A	109
25 at 8 weeks	3.2 C	14.7 A	104 B	185 BC	350 CDEF	211
50 " " "	3.2 ABC	15.4 A	133 BCD	254 CDEF	285 BC	228
75 " " "	2.8 A	15.2 A	108 BC	259 CDEF	388 CDEFG	293
100 " " "	3.6 BC	13.7 A	108 BC	223 CDE	346 BCDEF	252
150 " " "	3.0 ABC	15.2 A	130 BCD	254 CDEF	411 CDEFG	359
200 " " "	2.9 AB	16.6 A	128 BCD	280 EFG	461 FG	306
300 " " "	3.1 ABC	13.8 A	105 B	254 CDEF	485 G	447

## IV. GRAIN YIELD kg/ha

harvested November 7, 1975

Treatment kg kcl/ha	Rep 1	Rep 2	Rep 3	Total	Mean
Nil	164	100	93	357	119
25 at seeding	385	150	200	735	245
50 " "	415	364	465	1 244	415
75 " "	629	593	335	1 557	519
100 " "	686	629	543	1 858	619
150 " "	764	679	585	2 028	676
200 " "	757	593	686	2 036	679
300 " "	764	814	565	2 143	714
Nil	157	107	72	336	112
25 at 4 weeks	600	435	435	1 470	490
50 " " "	864	657	485	2 006	669
75 " " "	856	729	565	2 150	717
100 " " "	857	636	671	2 164	721
150 " " "	978	778	850	2 606	869
200 " " "	1 043	842	772	2 657	886
300 " " "	1 050	936	1 107	3 093	1 031
Nil	243	100	93	436	145
25 at 8 weeks	643	515	385	1 543	514
50 " " "	629	471	343	1 443	481
75 " " "	878	700	529	2 107	702
100 " " "	743	729	607	2 079	693
150 " " "	1 072	799	872	2 743	914
200 " " "	958	757	671	2 436	812
300 " " "	1 028	800	807	2 635	878

## V. K, Ca, Mg AND N IN PLANTS

## (a) Effect of Time of Sampling

## % K

Time of Application	Nil	25	50	75	100	150	200	300
<u>June 12</u>								
At seeding	1.17	1.50	1.70	1.71	1.90	2.46	2.28	2.62
At 4 weeks	1.12	1.26	1.13	1.18	1.08	1.21	1.20	1.16
At 8 weeks	1.12	1.14	1.08	1.19	1.17	1.20	1.15	1.14
<u>July 10</u>								
At seeding	.98	1.10	1.22	1.29	1.50	1.69	1.68	1.86
At 4 weeks	.90	1.39	1.41	1.61	1.81	2.13	2.22	2.54
At 8 weeks	.90	.91	.89	.99	.98	.99	.96	.94
<u>Aug 15</u>								
At seeding								
At 4 weeks								
At 8 weeks								
<u>Sept 17</u>								
At seeding								
At 4 weeks								
At 8 weeks								
<u>Oct 15</u>								
At seeding								
At 4 weeks								
At 8 weeks								

## % Ca

Time of Application	Nil	25	50	75	100	150	200	300
<u>June 12</u>								
At seeding	2.18	2.07	2.02	2.02	2.06	1.84	1.92	1.87
At 4 weeks	2.08	2.17	2.13	2.21	2.23	2.13	2.15	2.16
At 8 weeks	2.29	2.11	2.15	2.18	2.16	2.10	2.12	2.14
<u>July 10</u>								
At seeding	2.54	2.36	2.43	2.25	2.16	1.93	2.10	1.92
At 4 weeks	2.58	2.16	2.09	2.02	2.07	1.94	1.84	1.65
At 8 weeks	2.63	2.44	2.56	2.45	2.61	2.68	2.52	2.58
<u>Aug 15</u>								
At seeding								
At 4 weeks								
At 8 weeks								
<u>Sept 17</u>								
At seeding								
At 4 weeks								
At 8 weeks								
<u>Oct 15</u>								
At seeding								
At 4 weeks								
At 8 weeks								

5.

% Mg

Time of Application	Nil	25	50	75	100	150	200	300
<u>June 12</u>								
At seeding	.36	.35	.37	.39	.39	.37	.37	.39
At 4 weeks	.34	.37	.36	.35	.36	.36	.34	.35
At 8 weeks	.36	.35	.37	.34	.37	.35	.36	.37
<u>July 10</u>								
At seeding	.44	.41	.43	.41	.40	.37	.42	.41
At 4 weeks	.44	.40	.39	.38	.41	.39	.36	.36
At 8 weeks	.42	.39	.50	.46	.44	.41	.44	.44
<u>Aug 15</u>								
At seeding								
At 4 weeks								
At 8 weeks								
<u>Sept 17</u>								
At seeding								
At 4 weeks								
At 8 weeks								
<u>Oct 15</u>								
At seeding								
At 4 weeks								
At 8 weeks								

% N

Time of Application	Nil	25	50	75	100	150	200	300
<u>June 12</u>								
At seeding	4.51	4.39	4.26	4.39	4.17	4.21	4.46	4.28
At 4 weeks	4.46	4.29	4.31	4.35	4.42	4.38	4.46	4.49
At 8 weeks	4.78	4.51	4.47	4.44	4.48	4.46	4.59	4.68
<u>July 10</u>								
At seeding	5.43	5.35	5.57	5.42	5.73	5.41	5.68	5.44
At 4 weeks	5.30	5.63	5.60	5.43	5.67	5.57	5.52	5.67
At 8 weeks								
<u>Aug 15</u>								
At seeding								
At 4 weeks								
At 8 weeks								
<u>Sept 17</u>								
At seeding								
At 4 weeks								
At 8 weeks								
<u>Oct 15</u>								
At seeding								
At 4 weeks								
At 8 weeks								



## (b) Effect of plant part on K concentration

% K August 7, 1975

Treatment kg/ha kol	YP	OP	YL	OL	T
Nil	.46	.30	.65	.50	1.20
25 at seeding	.78	.31	.92	.44	1.41
50 at seeding	.68	.27	.86	.44	1.43
75 at seeding	.76	.37	.95	.35	1.50
100 at seeding	.75	.34	.91	.36	1.44
150 at seeding	1.07	.83	1.01	.75	1.69
200 at seeding	1.06	.58	1.02	.43	1.59
300 at seeding	1.50	1.64	1.19	.86	1.80

YP - Young petioles  
 OP - Old petioles  
 YL - Young leaves  
 OL - Old leaves  
 T - Tips

Critical levels at this time of harvest based on 90% of maximum yield are:-

YP .82  
 OP .35  
 YL .95  
 OL .38  
 T 1.5

## VI. K, Ca, Mg AND N UPTAKE

## K Uptake g/20 plants

Time of Application	0	25	50	75	100	150	200	300
<u>June 12</u>								
At seeding	.037	.055	.055	.051	.070	.074	.066	.080
At 4 weeks	.029	.039	.042	.031	.030	.035	.036	.037
At 8 weeks	.035	.037	.031	.036	.035	.038	.037	.034
<u>July 14</u>								
At seeding	.124	.166	.201	.191	.198	.255	.242	.250
At 4 weeks	.138	.203	.204	.249	.263	.315	.328	.368
At 8 weeks	.122	.138	.112	.148	.137	.128	.124	.138
<u>Aug 15</u>								
At seeding								
At 4 weeks								
At 8 weeks								
<u>Sept 17</u>								
At seeding								
At 4 weeks								
At 8 weeks								
<u>Oct 15</u>								
At seeding								
At 4 weeks								
At 8 weeks								
At seeding seed content of K = .027 g/20 seeds								

## Ca Uptake g/20 plants

Time Application	0	25	50	75	100	150	200	300
<u>June 12</u>								
At seeding	.065	.076	.065	.057	.075	.055	.055	.057
At 4 weeks	.954	.080	.072	.061	.059	.064	.060	.062
At 8 weeks	.058	.060	.062	.061	.057	.060	.061	.063
<u>July 14</u>								
At seeding	.326	.355	.400	.334	.282	.292	.303	.255
At 4 weeks	.396	.318	.301	.310	.296	.295	.269	.238
At 8 weeks	.302	.388	.287	.375	.415	.399	.326	.396
<u>Aug 15</u>								
At seeding								
At 4 weeks								
At 8 weeks								
<u>Sept 17</u>								
At seeding								
At 4 weeks								
At 8 weeks								
<u>Oct 15</u>								
At seeding								
At 4 weeks								
At 8 weeks								

## Mg Uptake g/20 plants

Time of Application	0	25	50	75	100	150	200	300
<u>June 12</u>								
At seeding	.011	.013	.012	.011	.014	.011	.011	.012
At 4 weeks	.009	.013	.012	.010	.011	.012	.011	.010
At 8 weeks	.010	.009	.011	.012	.010	.009	.010	.010
<u>July 14</u>								
At seeding	.056	.062	.070	.060	.052	.056	.060	.055
At 4 weeks	.067	.059	.057	.059	.059	.059	.054	.051
At 8 weeks	.057	.067	.044	.070	.070	.061	.056	.067
<u>Aug 15</u>								
At seeding								
At 4 weeks								
At 8 weeks								
<u>Sept 17</u>								
At seeding								
At 4 weeks								
At 8 weeks								
<u>Oct 15</u>								
At seeding								
At 4 weeks								
At 8 weeks								

## N Fixed and Absorbed g/20 plants

Time Application	0	25	50	75	100	150	200	300
<u>June 12</u>								
At seeding	.142	.160	.136	.123	.150	.123	.127	.131
At 4 weeks	.116	.167	.142	.131	.139	.127	.140	.136
At 8 weeks	.122	.134	.147	.130	.122	.118	.129	.132
<u>July 14</u>								
At seeding	.694	.805	.915	.803	.752	.827	.819	.722
At 4 weeks	.815	.827	.808	.835	.818	.849	.814	.817
At 8 weeks	.658	.808	.616	.794	.836	.814	.694	.815
<u>Aug 15</u>								
At seeding								
At 4 weeks								
At 8 weeks								
<u>Sept 12</u>								
At seeding								
At 4 weeks								
At 8 weeks								
<u>Oct 15</u>								
At seeding								
At 4 weeks								
At 8 weeks								

At seeding 20 seeds contain .150 g N