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W. B. BIZZELL, President

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DIVISION OF CHEMISTRY

EFFECT OF CROPPING UPON THE ACTIVE POTASH OF THE SOIL

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***In cooperation with United States Department of Agriculture.

SUMMARY

The active potash, which is the potash dissolved by N/5 nitric acid, is decreased when crops are grown upon the soil. The soils studied were cropped in pot experiments, with additions of dicalcium phosphate and ammonium nitrate. The amount of active potash lost from the soil in 409 experiments averages 40.9 per cent. of the potash removed by the crops. As successive extractions of the soil with the solvent remove active potash, and the soil also has a fixing power for potash, the active potash lost by cropping must be less than the potash removed by cropping. The correlation factor between the potash removed by the crops and the active potash lost from the soil is $.722 \pm .016$. This is a high correlation.

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Bulletin No. 325. September, 1924

THE EFFECT OF CROPPING UPON THE ACTIVE POTASH OF THE SOIL

G. S. Fraps

In Bulletin 145 of this Station, it is shown that the potash removed by crops from pot experiments is related to the active potash of the soil. It was also shown that the effect of the cropping was to decrease the amount of active potash left in the soil. The object of the present Bulletin is to study the effect of cropping upon the active potash of the soil.

SIGNIFICANCE OF ACTIVE POTASH

The term active potash is applied to the potash dissolved from the soil by fifth-normal nitric acid. This method is founded upon the work of Dyer, and was developed through the work of various referees of the Association of Official Agricultural Chemists. The amount of active potash

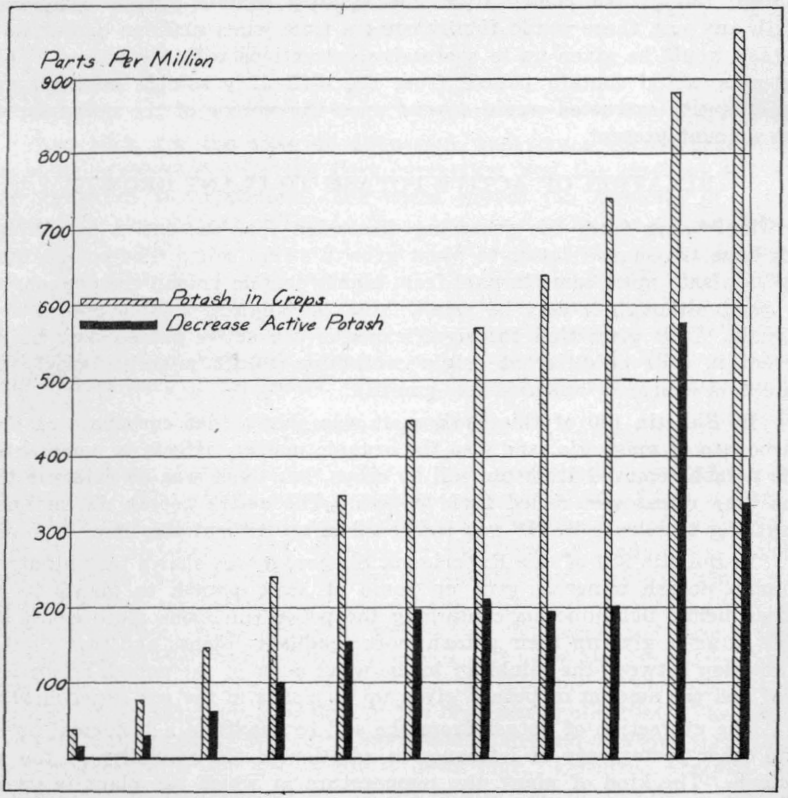

Figure 1.—Relation between the potash lost by crops and the decrease in active potash of the soil.

extracted from the soil depends upon the solubility of the soil potash in the solvent, and the fixing power of the soil under the conditions of the extraction (See Fraps Principles Agricultural Chemistry, page 183). All soils have a fixing power for potash, even in acid solutions, so that the amount of potash actually found does not represent the entire amount soluble in the solvent.

A study of the solubility of the minerals containing potash in fifth-normal nitric acid shows that some of them, such as felspar, are very slightly soluble in the solvent, and others such as biotite, moderately soluble, and others completely soluble in the solvent. A study of the effect of successive extractions upon the soil shows that unless the amount is very small the quantity of potash extracted becomes lower with each successive extraction, until it remains constant.

The potash extracted by fifth-normal nitric acid thus comes in part from easily soluble potash compounds, and in part from highly insoluble potash compounds. The potash in the first extractions comes largely from easily soluble compounds, and after these are decomposed and their potash removed, the potash comes from the slightly soluble potash compounds. With any soil, there would finally come a time when uniform quantities of potash would be given up to successive extractions with the solvent. These extracts would contain potash from the difficultly soluble minerals, and the quantity extracted would depend upon the nature of the minerals, and the amount present.

RELATION OF ACTIVE POTASH TO PLANT GROWTH

It is clear from the preceding discussion that the active potash cannot have the same relation to plant growth on all soils. The potash taken up by plants must come in part from highly soluble potash compounds, and in part, although it may be small, from the slightly soluble potash compounds. It is plain that the significance of the active potash may be different in soils of different origin containing potash minerals widely different in character and relative quantity.

In Bulletin 190 of this Station, it was shown that carbonate of lime, carbonate of magnesia, and also the organic matter, affects to some extent the potash removed from the soil by crops, but there was no evidence that the lime releases so-called fixed potash. The active potash did not need anything to release it. It was easily taken up without the lime.

In Bulletin 284 of this Experiment Station, it was shown that highly insoluble potash minerals give up some of their potash to plants in pot experiments, but minerals containing the potash in forms more easily soluble in acids give up their potash more readily to plants and that there is a relation between the solubility in the weak acids of the potash of the mineral and the amount of potash given up to plants in the pot experiments.

The extraction of potash from the soil by plants is a biological action, and other factors are of influence in addition to the solubility of the soil potash. The kind of plant, the temperature at which the plant is grown, the amount of air in the soil, the physical condition of the soil, the or-

ganic matter in the soil, the carbonate of lime in the soil, the hydrogen ion concentration of the soil and other conditions, no doubt influence the amount of potash withdrawn. It is quite possible that the amount of potash is so influenced by soil temperature that the potash removed by crops in Texas would not be the same as in cooler localities, such as Maine or Pennsylvania. This matter requires investigation.

Consideration of the effect of successive extractions upon the soil shows that we cannot expect the active potash to decrease in quantity equal to that removed by the crop.

The amounts of potash removed by successive extractions from some soils were as given in Table 1.

TABLE 1—Potash removed by successive extractions, in parts per million.

Laboratory No.	Extraction 1	Extraction 2	Extraction 3	Extraction 4	Extraction 5	Decrease From First to Second	Decrease of Second in Pct. of First Extraction
818	248	76	47	50	46	172	69.3
1122	167	75	45	59	92	92	55.1
2303	1066	1060	35	102	136	6	0.6
2301	94	57	30	45	66	37	39.4
2420	137	72	40	66	25	65	47.4

Supposing, for the sake of discussion, that crops should remove all the potash represented by the first extraction, and the cropped soil was then subjected to extraction. We could expect the amounts of potash given up by the cropped soil to be those represented by the second extraction. But the difference between the first extraction and the second extraction is less than the potash removed by the crops or by the first extraction. It varies from 0.6 to 69.3 per cent. in these particular soils. Hence we could expect the decrease of active potash in the cropped soil to be only part of the potash removed. Indeed, in the case of Soil 2303, the crops could remove part of the potash without affecting the active potash at all.

METHOD OF WORK

The method of work is the same as that previously described for pot experiments. The plants were grown in pots containing 5,000 grams of soil, which had been air-dried and pulverized. Phosphoric acid in the form of dicalcium phosphate, and nitrogen in the form of ammonium nitrate, were added to the pots to be studied for potash, and a pot to which sulphate of potash was also added was always used in the series as a check. Corn and sorghum were grown in succession. Nitrogen and potash were always added to the second crop of sorghum. If more than two crops were grown, the third crop always received another addition of phosphoric acid, nitrogen, or potash, corresponding to the previous application. The plants were grown in the greenhouse, and harvested at the end of about sixty days. The temperature in our greenhouse is quite high. Chemical analysis was always made of the crops which did not receive potash, for the amount of potash in these crops may vary to a wide extent. After the final harvest,

the soil was allowed to dry, it was then sifted, the roots removed, and active potash estimated in it. When two pots were used, both without potash, they were treated as if different soils for the purpose of this work.

TABLE 2—Effect of Cropping on Active Potash lost from the Soil, in parts per million.

GROUPS POTASH REMOVED	Potash Removed by Crops	Decrease in Active Potash of Soil	Active Potash Lost by Soil Divided by Potash Removed by Crops (in Pct)	Number of Soils Averaged
Group 0- 50	39	17	43.6	19
Group 51- 100	78	30	38.4	59
Group 101- 200	148	61	41.2	153
Group 201- 300	242	100	41.3	77
Group 301- 400	348	153	43.7	39
Group 401- 500	451	199	44.1	20
Group 501- 600	552	212	38.4	18
Group 601- 700	641	195	30.4	15
Group 701- 800	741	201	27.1	3
Group 801- 900	882	577	65.4	3
Group 901-1000	964	338	35.0	3
Total number of soils				409

RELATION OF THE POTASH REMOVED TO THE POTASH TAKEN UP BY THE CROPS

Table 2 shows the average relation between the active potash lost from the soil, and the potash taken up by the crops. It is seen from the table that the amount of potash withdrawn from the soil increases with the active potash present. The average active potash lost by the cropping in per cent of the potash removed by the crop varies from 27.1 to 65.4 per cent. in the different groups, but is really remarkably constant at around 40 per cent. The relations are also shown in Figure 1. Details of the experiments are given in Table 4.

THE CORRELATION BETWEEN THE ACTIVE POTASH REMOVED FROM THE SOIL AND THE ACTIVE POTASH LOST IN CROPPING

The correlation between the potash removed from the soil by the crops, and the active potash lost from the soil, is shown as Table 3. The highest figures of the group are given. Thus the 25 group includes 0-25, the 50 group includes 25.1-50, and so on. Careful observation of this table shows that the relation is not the same in all cases, and that there is a considerable variation in the loss of active potash from soils giving up the same amount of active potash to crops. Differences in the character of minerals which furnish the active potash, and differences in the soil conditions, may partly account for this variation, as well as biological relations. The fact that the same number of crops was not grown in each case is no doubt of influence, for since part of the active potash was removed by the first crop, the succeeding crops would have less active potash at their disposal,

POTASH REMOVED BY CROPS

LOSS FROM SOILS	25	50	75	100	125	150	175	200	225	250	275	300	325	350	375	400	425	450	475	500	525	550	575	600	625	650	675	700	725	750	775	900	950	1000	Total
25	2	11	19	14	8	7	4	4	1						1																				71
50		5	5	14	10	15	15	3	3	2	1	1		1						1															76
75			3	5	10	5	14	7	4	6	5	3		2					1								1								66
100					4	9	12	6	5	8	4	1	1		2			1	1		1		1		1										57
125					3	2	1	5	8	4	3	1	1	2	1						1		2	2	1		2								39
150							3	3	1		2	2	1	1	1	3								1	1	1				1					21
175							1			5		2	1	1	3	1	1	2	1	1				1	1	2									23
200								1		1		2	1	2	5		1	1			1														15
225									1		1	1		3		1			1	3		1			1	1	1				1				16
250													1	1		1	1						1	1											6
275																													1						1
300																												1							1
325																			1		1												1	1	4
350																		2																	2
375																					1													1	2
400																							1												1
425																																			0
450																																1			1
475																			1																1
500																																			0
525																																1			1
550																																			0
575																																			0
600																							1												1
625																																			0
650																																			0
675																																			0
800																							1		1							1			3
Total	2	16	27	33	35	38	50	29	23	26	16	13	6	13	13	6	3	6	6	5	5	1	7	5	6	4	4	1	1	1	1	3	1	2	408

TABLE 3—Correlation between the potash removed by crop and the active potash lost.

and would take a larger proportion of their potash from the difficultly soluble potash minerals.

The co-efficient of correlation (r) between the potash removed by the crops and the active potash lost from the soil, calculated from Table 3, is .722 ± .016.

This is a high correlation and shows a high relation between the potash removed by crops and the active potash lost by soils. The correlation between the butter production of cows and of their daughters is 0.28, and between the height of men and their sons is 0.51 (Warren, N. Y. Bull. 416). There is thus much closer relation between the potash removed by crops and the active potash lost by the soil than there is between the butter-fat productions of cows and of their daughters.

The regression coefficient is 0.409, which means that, on an average, 40.9 per cent. of the potash removed by the crops is taken from the active potash of the soil. This may be compared with the active potash lost by the first extractions in Table 1, which varies from 0.6 to 69.3 per cent., with an average of about 40.

DISCUSSION OF RESULTS

The relation between the active potash of the soil and the results of pot experiments is emphasized by the relation between the potash removed from the soil by crops, and the loss of active potash from the soil. If the effect of cropping the soil is to withdraw some of the active potash from the soil, then the estimation of active potash in the soil must be of considerable significance. The determination of active potash is a useful method for examination of the soil, if properly used.

When this method is applied to field conditions, other factors make the problem more difficult. The depth of the surface soil, the depth of soil occupied by the roots of plants, the power of the plant to take up potash, the soil temperature, moisture conditions, variations in the chemical composition of the soil, and other factors, affect the relation of the active potash to the crops actually produced. This is evident in the wide variation found to occur in the production of crops grown upon the same field in good seasons, and in bad seasons. For example, wheat yielded 16 bushels in a wet season, and 35.7 bushels on an average, at Rothamsted, on the plot receiving farm manure.

ACKNOWLEDGEMENT

Laboratory and other work involved in this Bulletin have been taken part in by S. E. Asbury, S. Lomanitz, John B. Smith, Waldo Walker, Velma Graham, and other members of the staff.

TABLE 4—Details of experiments, in parts per million of active potash.

Laboratory No.	In Crops	No. of Crops	Per Crop	Active Potash		Loss
				Before Cropping	After Cropping	
828	45	1	45	111	75	36
859	21	1	21	40	36	4
860	48	2	24	71	78	0
1200	34	2	17	70	78	0
8843	32	2	16	60	37	23
9163	40	2	20	35	39	0
9163	21	2	11	35	29	6
9165	42	2	21	38	28	10
9165	31	2	16	38	34	4
9180	44	2	22	62	82	0
9281	49	2	25	70	41	29
9303	50	2	25	59	38	21
9303	34	2	17	59	39	20
9310	48	4	12	75	41	34
9329	44	2	22	63	36	27
9348	30	2	15	71	94	0
9377	37	2	19	138	110	28
9384	47	2	24	76	67	9
Average group 0-50	39		20	67		17
348	95	2	48	133	65	68
969	79	2	40	85	64	21
1129	61	2	31	75	60	15
1130	97	2	49	79	56	23
1586	52	2	26	55	41	14
1591	76	4	19	62	43	19
1592	71	5	14	87	59	28
1933	98	1	98	190	135	55
1956	80	2	40	105	68	37
2350	93	3	31	86	63	23
2351	74	1	74	92	101	0
2824	94	2	47	105	71	34
5099	60	2	30	84	59	25
8838	62	2	31	59	40	19
8839	75	2	38	45	45	0
8839	56	2	28	45	66	0
8843	55	2	28	60	28	32
9040	85	2	48	96	47	49
9041	75	4	19	91	45	46
9139	61	2	31	62	37	25
9139	70	2	35	62	28	34
9180	76	2	38	62	56	6
9273	89	4	22	113	83	30
9274	55	2	28	128	123	5
9274	56	2	28	128	113	15
9280	86	2	43	70	35	35
9280	66	2	33	70	38	32
9281	63	2	32	70	51	19
9306	61	4	15	42	42	0
9308	79	2	40	175	173	2
9309	76	4	19	91	49	42
9329	61	2	31	63	39	24
9336	99	4	25	87	77	10
9347	74	2	37	73	64	9
9347	61	2	31	73	66	7

Table 4 (Con.) Details of experiments, in parts per million of active potash.

Laboratory No.	In Crops	No. of Crops	Per Crop	Active Potash		Loss
				Before Cropping	After Cropping	
9348	76	2	38	71	62	9
9349	100	4	25	104	60	44
9354	83	2	42	106	71	35
9359	97	2	49	93	70	23
9379	75	4	19	64	43	21
9384	68	2	34	76	51	25
9691	66	2	33	76	74	2
10603	100	2	50	166	133	33
12594	95	4	24	77	34	43
12599	91	4	23	83	42	41
12661	99	2	50	109	43	66
12674	72	2	36	88	27	61
12674	62	2	31	88	29	59
12676	92	2	46	123	56	67
12679	64	2	32	84	31	53
12679	90	2	45	84	31	53
17746	91	2	46	93	30	63
17746	89	2	45	93	19	74
18225	90	2	45	79	59	20
18539	87	2	44	51	39	12
18539	100	2	50	51	31	20
18541	75	2	38	45	20	25
18541	82	2	41	45	35	10
18544	100	2	50	61	23	38
18544	85	2	43	61	22	39
Average group 51-100.	78		37	84		30
335	127	2	64	115	96	19
821	102	5	20	131	77	54
850	141	1	141	187	69	118
932	198	2	99	282	139	143
119	194	3	65	220	77	143
1123	184	2	92	231	54	177
1124	167	2	84	178	61	117
1126	139	4	35	109	73	36
1129	127	2	64	75	58	17
1133	106	2	53	130	66	64
1134	193	3	64	149	64	85
1139	101	2	51	107	56	51
1205	161	2	81	241	151	90
1587	125	6	21	67	31	36
1588	138	6	23	102	40	62
1590	160	5	32	97	53	44
1594	194	5	39	52	52	0
1926	163	1	163	244	150	94
1931	109	2	55	170	69	101
1932	107	2	54	123	70	53
1934	134	1	134	267	208	59
1935	163	1	163	242	169	73
1956	180	6	30	105	71	34
2341	123	2	62	153	93	60
2341	162	2	81	153	96	56
2342	159	3	53	132	74	58
2347	121	3	40	148	49	99
2348	176	4	44	91	47	44

Table 4 (Con.) Details of experiments, in parts per million of active potash.

Laboratory No.	In Crops	No. of Crops	Per Crop	Active Potash		Loss
				Before Cropping	After Cropping	
2352	112	4	28	140	61	79
2410	101	3	34	112	53	59
2825	124	4	31	117	90	27
2826	195	3	65	92	69	23
2830	142	2	71	151	96	55
2830	162	3	54	151	96	55
2948	139	2	70	86	44	42
3339	111	2	56	280	164	116
3340	187	2	94	246	150	96
3350	105	4	26	154	47	107
3655	179	10	17	91	40	51
3655	158	8	19	91	57	34
3663	140	3	47	153	118	35
3975	104	2	52	81	61	20
4597	170	10	17	124	48	76
4597	193	10	19	124	40	84
4603	155	1	155	359	197	163
4644	141	4	35	143	51	92
5700	116	9	13	58	35	23
5700	110	10	11	58	44	14
5711	171	9	19	93	65	28
5711	157	9	17	93	75	18
5946	136	4	34	140	43	97
5968	114	9	13	118	30	88
6269	108	10	10	57	36	21
6269	101	10	10	57	39	18
6881	188	4	47	139	34	105
7092	165	4	41	136	60	76
7357	157	4	39	104	73	31
8815	172	2	86	61	46	15
8815	122	2	61	88	63	25
8816	126	4	31	34	32	2
8835	170	4	42	101	66	35
9040	102	2	51	96	47	49
9042	143	4	36	100	52	48
9043	147	4	37	108	97	11
9173	110	4	27	116	74	42
9175	149	2	75	225	196	29
9308	162	2	81	175	133	42
9308	114	2	57	175	140	35
9313	141	2	71	169	142	27
9328	112	2	56	212	174	38
9328	183	2	92	212	149	63
9335	132	2	66	161	90	71
9335	192	2	96	161	93	68
9350	153	4	38	111	88	23
9352	157	4	39	155	120	30
9359	150	2	75	93	67	26
9354	151	2	76	106	74	32
9377	132	2	66	138	49	89
9385	132	2	66	115	78	37
9691	136	2	68	76	47	29
10603	179	2	90	166	133	33
12498	133	4	33	81	68	13
12499	126	4	32	64	56	8

Table 4 (Con.) Details of experiments, in parts per million of active potash.

Laboratory No.	In Crops	No. of Crops	Per Crop	Active Potash		Loss
				Before Cropping	After Cropping	
12500	113	4	28	60	41	19
12500	101	4	25	60	35	25
12504	169	4	42	170	121	49
12505	199	4	50	132	111	21
12512	187	4	47	141	72	69
12512	135	4	34	141	57	84
12513	157	4	39	90	48	42
12513	146	4	37	90	53	37
12519	153	4	38	100	70	30
12519	153	4	38	100	81	19
12586	170	4	42	193	53	140
12586	177	4	44	193	48	145
12587	162	4	41	160	85	75
12587	134	4	34	160	77	83
12589	177	4	44	171	54	117
12589	199	4	50	171	50	121
12590	176	4	44	166	65	101
12590	176	4	44	166	69	97
12591	136	4	34	89	72	17
12592	198	4	49	161	54	107
12592	145	4	36	161	52	109
12593	139	4	35	86	40	46
12593	157	4	39	86	47	39
12594	107	4	27	77	36	41
12595	116	4	29	73	42	31
12597	163	4	41	121	46	75
12597	155	4	39	121	50	71
12598	119	4	30	108	29	79
12598	122	4	31	108	44	64
12599	107	4	27	83	33	50
12641	158	4	39	134	53	81
12641	168	4	42	134	48	96
12655	137	2	69	148	53	95
12655	133	2	67	148	65	83
12656	126	2	63	125	45	80
12656	130	2	65	125	45	80
12661	106	2	53	109	41	68
12671	164	2	82	190	64	126
12671	151	2	76	190	63	127
12676	105	2	53	123	62	61
17501	162	2	81	256	163	93
17501	161	2	81	256	161	95
17717	175	2	87	114	65	49
17717	133	2	67	114	48	66
18206	178	2	89	128	53	75
18208	171	2	86	136	38	78
18223	171	2	86	78	33	45
18224	130	2	65	102	57	45
18227	142	2	71	65	19	46
18228	126	2	63	84	36	48
18228	124	2	62	84	54	30
18230	170	2	85	137	56	81
18230	172	2	86	137	64	73
18231	130	2	65	106	60	46
18233	166	2	83	134	69	65

Table 4 (Con.) Details of experiments, in parts per million of active potash.

Laboratory No.	In Crops	No. of Crops	Per Crop	Active Potash		Loss
				Before Cropping	After Cropping	
18235	154	2	77	68	15	53
18235	185	2	93	68	51	17
18537	170	2	85	108	30	78
18538	124	2	62	90	37	53
18538	111	2	56	90	20	70
18540	169	2	85	98	32	66
18540	196	2	98	98	43	55
18542	178	2	89	121	33	88
18542	173	2	87	121	68	53
18543	136	2	68	90	24	66
18546	166	2	83	130	53	77
19547	177	2	89	110	53	57
18548	175	2	88	101	45	56
18548	156	2	78	101	77	34
18210	198	2	99	174	76	98
Average group 101-200	148		57	131		61
834	230	1	230	310	156	154
1138	210	5	42	151	104	47
1203	201	2	100	601	381	220
1207	241	3	80	252	131	121
1597	284	5	57	164	26	138
1928	296	1	296	429	276	153
1928	251	2	126	270	169	101
2822	253	4	63	198	99	99
2946	241	2	121	379	222	157
3332	267	4	67	126	49	77
3335	278	1	278	447	380	67
3345	247	2	124	319	168	151
3346	204	1	204	273	160	113
3631	250(?)	3	83	300	234	66
3633	274	3	91	259	196	63
3662	270	2	135	242	133	109
5098	214	10	21	158	42	116
5098	202	10	20	158	43	115
6010	289	10	29	169	45	124
6010	221	10	22	169	56	113
7117	285	4	71	170	101	69
7108	201	4	50	181	36	145
7353	266	4	67	203	63	140
8837	204	4	51	105	100	5
9039	213	2	106	240	155	85
9175	239	2	120	225	131	94
9313	227	2	114	169	108	61
9327	261	2	131	273	188	85
9334	212	4	53	125	92	33
9380	285	4	71	261	84	177
9385	214	2	107	115	65	50
12498	238	4	59	81	46	35
12504	249	4	62	170	127	43
12514	213	4	53	105	41	64
12514	238	4	59	105	24	81
12518	215	4	54	166	62	104
12518	242	4	61	166	68	98
12520	258	4	65	136	84	52

Table 4 (Con.) Details of experiments, in parts per million of active potash.

Laboratory No.	In Crops	No. of Crops	Per Crop	Active Potash		Loss
				Before Cropping	After Cropping	
12520	259	4	65	136	84	52
12521	277	4	69	167	79	88
12521	277	4	69	167	95	72
12576	299	4	75	178	131	47
12576	300	4	51	178	114	64
12577	263	4	66	181	112	69
12577	238	4	59	181	118	63
12578	261	4	65	221	78	143
12578	238	4	59	221	108	113
12579	205	4	51	166	61	105
12579	207	4	52	166	90	76
12640	248	4	62	183	121	62
12588	274	4	68	281	66	215
12642	227	4	57	133	85	48
12642	207	4	52	133	74	59
12648	248	4	62	208	138	70
12648	274	4	68	208	146	62
12652	215	2	108	265	146	119
12653	283	2	142	329	146	183
12658	242	2	121	232	131	101
12658	228	2	114	232	142	90
12659	247	2	124	325	145	180
12660	219	2	110	194	85	109
12660	226	2	113	194	92	102
12668	239	2	120	221	46	175
12668	232	2	116	221	64	157
17500	230	2	115	367	301	66
17500	242	2	121	367	286	81
18205	207	2	104	158	58	100
18205	204	2	102	158	58	100
18207	241	2	121	162	86	76
18209	252	2	126	165	70	95
18226	288	2	144	239	95	144
18229	201	2	100	147	49	98
18229	237	2	119	147	60	87
18232	253	2	127	201	99	102
18232	240	2	120	201	119	82
18536	299	2	150	291	80	211
18546	201	2	100	130	70	60
Average group 201-300	242		94	209		100
818	300	2	150	274	99	175
832	350	2	175	271	64	207
982	354			219	195	24
1577	329	4	82	207	102	105
1927	400	3	133	300	161	139
2340	358	3	119	278	94	184
2828	392	3	131	308	160	148
2959	331	3	110	500	312	188
3632	332	3	111	311	165	146
5960	366	2	183	243	65	178
7148	374	4	94	203	43	180
9045	304	2	152	561	436	125
9167	371	2	186	324	178	146
9672	358	2	179	399	207	192

Table 4 (Con.) Details of experiments, in parts per million of active potash.

Laboratory No.	In Crops	No. of Crops	Per Crop	Active Potash		Loss
				Before Cropping	After Cropping	
12503	342	4	86	160	85	75
12569	362	4	91	265	169	96
12571	335	4	84	100	72	28
12583	357	4	89	290	99	191
12585	400	4	100	390	166	224
12588	309	4	77	281	48	233
12596	369	4	92	183	77	106
12639	382	4	95	239	112	127
12639	357	4	89	239	80	159
12640	323	4	81	183	86	97
12647	323	4	81	270	72	198
12647	328	4	82	270	116	154
12649	352	4	88	256	161	95
12650	343	4	86	230	160	70
12650	348	4	87	230	120	110
12651	381	2	191	359	125	234
12652	313	2	157	265	118	147
12653	339	2	169	329	151	178
12657	394	2	197	367	201	166
12659	357	2	179	325	126	199
12678	329	2	165	574	348	226
17444	347	2	174	343	141	202
17444	360	2	180	343	186	157
18222	309	2	154	238	84	154
18536	331	2	166	291	67	224
Average group 301-400	348		127	290		153
1202	450(?)	2	225	736	399	337
1580	451	6	75	657	205	452
2346	452	2	226	224	50	174
3634	430	2	215	243	165	78
9297	438	2	219	408	232	176
9381	453	4	113	408	100	308
12515	455	4	114	195	116	79
12515	460	4	115	195	132	63
12536	465	4	116	278	58	220
12536	497	4	124	278	66	212
12575	434	4	109	337	170	167
12584	488	4	122	386	169	217
12584	480	4	120	386	169	217
12643	483	4	121	441	273	168
12651	404	2	202	359	121	238
12657	411	2	206	367	201	166
12678	450	2	225	574	238	336
18234	416	2	208	289	106	183
18234	433	2	217	289	133	156
Average group 401-500	451		159	361		199
3344	544	4	136	461	242	219
5940	523	4	131	464	276	188
6977	596	10	59	249	141	108
7373	597	4	149	271	101	170
9044	564	2	282	1409	816	593
9044	564	2	282	1409	726	693

Table 4 (Con.) Details of experiments, in parts per million of active potash.

Laboratory No.	In Crops	No. of Crops	Per Crop	Active Potash		Loss
				Before Cropping	After Cropping	
9382	573	2	287	561	170	391
12535	576	4	188	208	68	140
12568	509	4	127	270	163	107
12570	525	4	131	200	102	98
12573	571	4	143	530	290	240
12574	576	4	184	434	202	232
12581	555	4	144	183	99	84
12582	596	4	144	275	170	105
12644	562	4	141	346	226	120
12649	502	4	125	256	133	123
12677	503	2	252	540	175	365
12677	506	2	253	540	218	322
Average group 501-600	552		175	478		237
2956	700	4	175	629	329	300
5955	616	2	308	1005	297	708
6977	658	10	65	249	142	107
12502	641	4	160	265	93	172
12516	618	4	154	295	130	165
12517	657	4	164	196	136	60
12517	619	4	155	196	103	93
12533	649	4	162	311	92	219
12533	658	4	164	311	108	203
12534	664	4	166	238	113	125
12573	614	4	154	530	320	210
12580	615	4	154	248	131	117
12580	646	4	162	248	109	139
12582	623	4	156	275	125	150
12646	633	4	158	485	332	153
Average group 601-700	641		163	365		195
1936	772	5	154	376	174	202
7147	715	4	179	524	262	262
12516	735	4	184	295	155	140
Average group 701-800	741		172	398		201
5955	888	4	222	1005	224	781
12531	880	4	220	628	196	432
12572	877	4	219	855	337	518
Average group 801-900	882		220	829		577
1929	981	5	196	491	176	315
12645	934	4	234	606	283	323
12645	977	4	244	606	231	375
Av. group 901-1000	964		225	568		338

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