FERTILIZER IN RELATION TO QUALITY AND TO DAMAGE SUSCEPTIBILITY. 1973

SUMMARY: Emergence was retarded by increasing rates of muriate of potash but sulphate of potash even at 500 units/acre had no affect. On this low potash site deficiency symptoms were observed in early July with complete collapse of haulm on the Nil potash plots by the end of the month. Yields responded to potash up to 2-300 units/acre particularly with Desiree.

Level of nitrogen had little affect on yield or bruising at the rates tested but increasing levels of potash caused a significant reduction in bruising.

OBJECT: To determine the effects of various rates of potash (both muriate and sulphate) and of nitrogen on the damage susceptibility of the two varieties Desiree and Pentland Crown.

LAYOUT: 3 randomised blocks - factorial.

TREATMENTS	Levels of potash (units/acre)	Type of potash	Level of nitrogen
	0	a) Muriate	120 units
	100	b) Sulphate	180 units
	200		
	300		
	400		
	500		

The trial was conducted separately on Desiree and Pentland Crown.

SITE: Broom Close, grown on 36in. rows.

PREVIOUS CROPPING: 1972 Spring barley
1971 Sugar beet
1970 Winter wheat

MANURING: 2 cwt/acre kieserite
11 cwt/acre 15-15-25 compound fertilizer.

HUSBANDRY RECORDS:
9 March, fertilizer treatments applied to Pentland Crown
12 March, nitrogen spread on Desiree
13 March, potash spread on Desiree
16 March, 120N, 170P and kieserite spread across allplots.
26 March, both varieties planted
26 April, both varieties pulled down and ridged up
1 May, both trials sprayed for weed control. (5lb Bronox)
5 June, scored for emergence
21 June, 6oz Demeton-S-Methyl + 1½lb Dithane by tractor.
4 July " " " " " " "
24 July " " " " " " "
2 August 1½lb Dithane by aircraft
13 August 1½lb Erithane " "
23 August " " " "
24 August, scored for top growth
11 September, " " " "
13 September, trial burnt off with sulphuric acid
24 October trials lifted
26-27 November, Desiree weighed and specific gravity recorded
28-29 November Pentland Crown " " " " "
8-17 January 1974 assessing bruising

POTATOES

Fertilizer in Relation to Quality and Damage Susceptibility NAS 805 ML

METHOD

A fully factorial layout was used including all combinations of the following treatments.

a) Rate of potash fertilizer - 0, 100, 200, 300, 400, 500 units/acre
b) Two types of potash fertilizer - muriate and sulphate
c) Two levels of nitrogen - 120 and 180 units/acre

There were two separate trial areas planted with Pentland Crown and Désirée respectively. Planting was carried out on 26 March. Ferilizer application was 10-14 days earlier when 120 units of nitrogen, 170 units of phosphate and 2 cwt of kieserite/acre were applied using the farm spreader. The balance of nitrogen and potash was broadcast on each plot by hand before seedbed preparation. The trial was planted using a Howard Rotaplanter setting once grown seed at about 1 ton/acre.

RESULTS - Pentland Crown

Although planted in good conditions emergence was slow because of subsequent cold weather. By the time emergence counts were made on 5 June it was noted that some plants were much more forward than others as shown in table 1. There was a highly significant reduction in the number of large plants as muriate levels were increased but sulphate of potash had little or no effect on early growth. Total plant numbers were not affected by treatments.

Table 1 - Number of large plants on 5 June (000's/acre)

Level of Potash units/acre	Type of Potash Muriate	Sulphate	MEAN
	(±0.42)		(±0.30)
0	7.5	7.0	7.2
100	7.0	8.0	7.5
200	6.7	7.2	6.9
300	6.8	6.9	6.8
400	5.7	7.0	6.4
500	4.7	7.5	6.1
	(±0.17)		
MEAN	6.4	7.3	

SE per plot ±1.04(46d.f.) or 15.1% of G.M.

The site used for this trial was rather low in potash. Each block of the trial was soil sampled separately and two blocks were 62-66 p.p.m. of potash - low in index 1 and one block was 55 p.p.m. - index 0 (A.D.A.S. categories). This analysis was carried out on the topsoil (0-6in.) and the 6-12in layer which was very similar. By early August deficiency symptoms were visible in those plots receiving less than 200 units of potash. The plots were scored for vigour on 23 August and 11 September as shown on table 2. A 0-10 scale was used - 0 representing complete complete senescence and 10 where every plant was still exceptionally vigorous.

Table 2. Vigour of haulm growth

Level of Potash units/acre	Vigour Score (0-10) 23 August		11 September	
	Muriate	sulphate	Muriate	sulphate
	(±0.26)		(±0.43)	
0	7.2	6.0	3.7	2.2
100	8.7	7.8	5.7	4.6
200	8.6	8.7	6.3	6.5
300	8.5	8.7	6.4	6.4
400	8.9	9.2	6.7	6.5
500	8.6	9.1	6.4	7.2

SE per plot, August ±0.65(46d.f.) or 7.8% of G.M.
SE per plot, September ±1.06(46d.f.) or 18.5% of G.M.

It was also interesting to note that vigour at both dates was increased by the higher rate of nitrogen although at harvest the yields were slightly depressed.

Yields Table 3 Ware yield ($1\frac{3}{4}$-$3\frac{1}{4}$in.)

Level of Potash units/acre	Ware yield (ton/acre) Muriate	Sulphate	MEAN
	(±0.61)		(±0.43)
0	13.8	11.8	12.8
100	14.8	14.4	14.6
200	15.6	15.7	15.6
300	15.9	15.7	15.8
400	14.8	15.7	15.2
500	14.4	16.0	15.2
	(±0.25)		
MEAN	14.9	14.9	

SE per plot ±1.50 (46d.f.) or 10.1% of G.M.

Ware yield shown in table 3 responded to increasing potash up to 300 units/acre but beyond this level muriate of potash caused a slight reduction. This is in line with early growth shown in table 1 and follows broadly the total yield shown in appendix 1. The yield at 180 units/acre of nitrogen was 0.62 tons/acre less than at 120 units but this just failed to reach significance. The yield of waste - cracks, dolls, greens and tubers outside the ware grade, was signifiantly increased by the higher rate of nitrogen or the use of muriate compared with sulphate. Total waste is shown in appendix 2.

Increasing the level of potash as either muriate or sulphate reduced the yield(and percentage) of tubers falling in the $1\frac{1}{4}$-$1\frac{3}{4}$in. and $1\frac{3}{4}$-$2\frac{1}{4}$in. fractions. Yields of tubers from $2\frac{1}{4}$ in. upwards were increased by increasing potash levels.

Samples of tubers analysed by A.D.A.S. Cambridge showed that both potash and magnesium increased in the tubers as fertilizer potash was increased as shown in table 4.

Table 4 Analysis of tubers - (mean of muriate and sulphate)

Level of Potash units/acre	% potassium	% magnesium
0	1.49	0.079
100	1.70	0.079
200	1.74	0.083
300	2.00	0.090
400	2.22	0 090
500	2.22	0.100

The crop received 2cwt/acre of kieserite and sampling after application at 0-6in showed the soil to contain 69-74 p.p.m. of magnesium-index 2 for magnesium over the trial area. It is generally believed that high levels of potash tend to depress magnesium uptake but this did not occur in the trial even at 500 units/acre of potash. In fact the crop seemed able to maintain a constant ratio of potash to magnesium of just over 20:1 at all fertilizer levels. The uptake of calcium did not appear to be affected by fertilizer treatment and remained very uniform at around 0.03%.

The specific gravity of the tubers was measured at riddling on a sample of $2\frac{1}{4}$ -$2\frac{3}{4}$in. tubers from each plot. The results in table 5 show that sulphate of potash produced a higher specific gravity than muriate of potash. Since the plots receiving no potash matured prematurely it seems reasonable to dismiss them from consideration in which case the specific gravity was reduced by increasing levels of potash. This was clearly evident where muriate of potash was used but much less evident with sulphate of potash. The overall effect of increasing nitrogen from 120 to 180 units/acre was to reduce the specific gravity from 1.1056 to 1.1032.

Table 5 Specific Gravity

Level of Potash units/acre	Specific Gravity Muriate	Sulphate	MEAN
	(±0.00150)		(±0.00106)
0	1.1032	1.1016	1.1024
100	1.1051	1.1083	1.1067
200	1.1025	1.1072	1.1049
300	1.1022	1.1088	1.1055
400	1.1002	1.1080	1.1041
500	1.0997	1.1058	1.1028
	(±0.00061)		
MEAN	1.1022	1.1066	

SE per plot ±0.00368 (46d.f.) or 0.3% of G.M.

Further samples were tested by A.D.A.S. to determine the dry matter content as shown in table 6. These follow the specific gravity levels quite closely as would be expected and in this case the higher rate of nitrogen depressed dry matter from 24.56 to 23.72%. Thus the measurement of specific gravity and dry matter confirmed that muriate of potash produces tubers of lower dry matter and that increasing fertilizer potash or nitrogen tends to reduce the dry matter content of the crop. It will be seen later that mechanical damage was less on low dry matter tubers where this was due to type or rate of potash application and there were some indications that damage was affected by the level of nitrogen also.

The were crop was divided into three size fractions, $1\frac{3}{4}$-$2\frac{1}{4}$in., $2\frac{1}{4}$-$2\frac{3}{4}$in., and $2\frac{3}{4}$-$3\frac{1}{4}$in. Each of these was assessed for damage caused by routine harvesting and riddling operations. It must be pointed out that riddling was carried out under very cold conditions with the temperature at 0 to 1°C so that damage during riddling was abnormally high. The damage assessment was carried out some weeks after riddling to allow all bruises to develop. Fifteen sample tubers of each size were peeled in a commercial peeler for 60 seconds to remove 1-2mm of the surface. Remaining damage was then assessed according to size and depth of damaged tissue. The maximum width of each area of damage was measured and classified according to diameter-0-1cm (small), 1-2.5cm(medium) and over 2.5 cm (large). The depth was then measured as the number of strokes of a hand peeler (removing about 1mm/stroke) required to remove the damage.

Table 6 - Dry matter of tubers.

Level of Potash units/acre	% Dry Matter Muriate	Sulphate	MEAN
0	24.85	23.50	24.18
100	25.15	24.95	25.05
200	25.00	26.65	25.83
300	22.85	24.45	23.65
400	21.45	22.80	22.13
500	21.42	23.80	22.61
MEAN	23.45	24.36	

There was no sonsistent affect of treatment on depth of bruises but in almost every case the number of bruises per tuber was reduced by increasing potash levels or by the use of muriate rather than sulphate of potash. Similarly the higher level of nitrogen resulted in a small overall reduction in total damage but this never reached statistical significance at the 5% level.

Results are available for the total number of bruises on each of the three size fractions of ware produce and in each case increasing potash significantly reduced damage susceptibility. Muriate reduced damage more than sulphate on all sizes of tubers. Table 7 shows the results for $2\frac{1}{4}$-$2\frac{3}{4}$in. tubers, this size being chosen as that being the most constant percentage of the ware produce from each treatment. Similar information on the other size grades is given in the appendix. On this middle ware fraction the higher level of nitrogen reduced bruises from 6.12 to 5.73 per tuber. There were frequent indications that the sulphate responded more favourably to the high nitrogen while muriate was little affected.

Table 7 Total Bruises per tuber on $2\frac{1}{4}$ - $2\frac{3}{4}$in. sample.

Level of Potash units/acre	Bruises/tuber Muriate	Sulphate	MEAN
	($\pm$0.461)		($\pm$0.326)
0	7.13	6.96	7.05
100	5.55	7.54	6.54
200	5.51	5.99	5.75
300	5.00	7.87	6.43
400	4.94	6.03	5.49
500	4.05	4.50	4.27
	($\pm$0.188)		
MEAN	5.36	6.48	

SE per plot $\pm$1.129 (46d.f.) or 19.1% of G.M.

The majority of shallow bruises were only a grey colour and being small may have been regarded as acceptable for some purposes. The data was therefore checked to see what effect there would be on the result if bruises of less than 3mm depth were disregarded and it was found that this eliminated approximately 30% from each treatment. The result was that the figures shown in Table 7 for muriate of potash were reduced from 7.13 to 4.64 bruises/tuber at Nil K and from 4.05 to 2.60 bruises/tuber at 500 K and the proportional reduction was similar for all treatments. Since different levels of fertilizer produced different sizes of tubers a comparison of bruising on tubers of a selected size is not fair to those treatments producing a larger mean size of tuber. By recording tuber size distribution in the original ware crop the damage has been weighted to take account of size differences and the damage per pound of ware produce($1\frac{3}{4}$-$3\frac{1}{4}$in) is shown in table 8.

Table 8 Bruises per pound of Ware Crop

Level of Potash units/acre	Bruises/lb Muriate	Sulphate	MEAN
0	17.49	16.41	16.95
100	13.79	18.03	15.91
200	13.59	14.74	14.17
300	11.62	15.51	13.57
400	11.71	13.61	12.67
500	9.53	10.82	10.18
MEAN	12.96	14.85	

On this low potash site, the use of 500 units of potash on average reduced damage by 40% when compared with plots unfertilized with potash and by 28% when compared with those plots receiving 200 units/acre which is the level frequently used. The reduction was greater when muriate of potash was used than with sulphate of potash.

Consistently, large tubers were bruised more than small tubers and because of the high level of bruising in the trial due to the conditions under which riddling was done, both the large and medium tubers were virtually all bruised. However, there was a proportion of unbruised tubers in the $1\frac{3}{4}$-$2\frac{1}{4}$in. fraction as shown in table 9.

Table 9 Percentage of Tubers bruised ($1\frac{3}{4}$-$2\frac{1}{4}$in. tubers)

Level of Potash units/acre	% Bruised Muriate	Sulphate	MEAN
	(±4.66)		(±3.30)
0	95.6	95.6	95.6
100	90.0	93.3	91.7
200	94.4	93.3	93.9
300	87.8	93.3	90.6
400	77.8	88.9	83.3
500	74.4	85.6	80.0
	(±1.90)		
MEAN	86.7	91.7	

S.E. per plot ±11.42 (46d.f.) or 12.8% of G.M.

There was a clear indication that when muriate of potash was used the reduction in bruising was greater than when sulphate of potash was used but this could be connected with the reduction of early growth and subsequent relative immaturity. This difference between types of potash must therefore be confirmed by further work, applying the potash earlier if necessary to avoid toxicity.

Damage was mainly of two types. Many flesh wounds could be directly related to an impact on the tuber surface but other areas of flesh showed blackening deep inside the tuber which did not appear to be directly related to surface damage. All assessments so far discussed relate to total damaged tissue and there was an obvious reduction of total damage in this trial where potash levels were increased. Since some authorities suggest that only the deep internal blackening is affected by potash levels, the incidence of this damage was scored on a 0-10 scale where 0 was free of damage and 10 represented 100 per cent of tubers showing blackening. Table 10 shows the results for the $2\frac{1}{4}$-$2\frac{3}{4}$in. fraction. Blackening was reduced by an average of 56% when 500 units of potash is compared with no potash or by 44% where 500 units is compared with 200 units. In addition, although nitrogen itself had no direct effect, there was a significant interaction between nitrogen and potash type with sulphate of potash producing least damage at the high level of nitrogen and muriate producing least damage at low nitrogen as shown in table 11.

Table 10 Internal Blackening of tubers($2\frac{1}{2}$-$2\frac{3}{4}$in.)

(0=free of blackening, 10= severe blackening)

Level of Potash unit/acre	Blackening score(0-10) Muriate	Sulphate	MEAN
	(±0.56)		(±0.40)
0	4.5	3.7	4.1
100	2.7	4.5	3.6
200	2.7	3.7	3.2
300	2.2	4.0	3.1
400	1.8	2.0	1.9
500	1.5	2.0	1.8
	(±0.23)		
MEAN	2.6	3.3	

S.E. per plot ±1.38 (46d.f.) or 46.9% of G.M.

The produce which was most free of blackening was that receiving 500 units of muriate of potash at the low level of nitrogen. This treatment was scored 0.7 for blackening. This is in fact the same treatment that showed the lowest level of total damage on all three size fractions of ware produce in the assessments described earlier.

Table 11 Internal Blackening of tubers($2\frac{1}{2}$-$2\frac{3}{4}$in.)

Level of nitrogen units/acre	Blackening score Muriate	Sulphate	MEAN
	(±0.32)		(±0.23)
120	2.1	3.8	3.0
180	3.0	2.8	2.9
	(±0.23)		
MEAN	2.6	3.3	

S.E. per plot ±1.38(46d.f.) or 46.9% of G.M.

Results - Désirée

Table 1 - Number of large plants on 5 June (000's/acre).

Number of Potash units/acre	Type of Potash Muriate	Sulphate	MEAN
	(±0.360)		(±0.255)
0	5.42	5.58	5.50
100	5.06	5.46	5.26
200	4.21	5.46	4.82
300	3.93	5.46	4.69
400	3.16	5.75	4.45
500	2.31	5.79	4.05
	(±0.146)		
MEAN	4.01	5.58	

S.E. per plot ±0.878 (46d.f.) or 18.3% of G.M.

The reduction in early growth as a result of increasing levels of muriate of potash was even more marked on this variety than on Pentland Crown but again, sulphate of potash even at 500 units/acre had no detrimental effect.

All three blocks of the Désirée trial were classified as index 1 for potash (66-72 p.p.m. in the top 6in.) when the soil was analysed. This is higher than the Pentland Crown site where one block was index 0, but Desiree showed deficiency symptoms earlier and to a greater extent as will be seen by comparing table 2 with the corresponding table in the Pentland Crown report. In the case of Désirée, the vigour of haulm growth was restricted by treatments receiving less than 400 units of potash.

Table 2 - Vigour of Haulm

Level of Potash units/acre	Vigour Score (0-10) 23 August Muriate	Sulphate	11 September Muriate	Sulphate
	(±0.44)		(±0.36)	
0	3.5	3.7	1.1	1.0
100	6.2	5.3	2.1	2.0
200	7.5	6.5	4.4	3.0
300	8.3	7.5	5.7	4.0
400	8.8	7.7	6.7	5.4
500	8.8	8.7	7.2	5.9

S.E. per plot, August ±1.08 (46d.f.) or 15.7% of G.M.
S.E. per plot, September ±0.87(46d.f.) or 21.5% of G.M.

The higher level of nitrogen again gave some increase in top growth and on this variety the muriate of potash produced haulm which was significantly more vigorous than that receiving sulphate of potash

Yields

With Désirée, increasing the level of potash as muriate or sulphate had little affect on the yield of small ware ($1\frac{3}{4}$-$2\frac{1}{4}$in.) at around 6 ton/acre for muriate and 7 ton/acre for sulphate of potash. In the two larger size fractions, increasing potash levels significantly increased yields so that total ware yield responded as shown in table 3. Total yield is shown in Appendix 1.

Table 3 - Ware Yield ($1\frac{3}{4}$-$3\frac{1}{2}$in.)

Level of Potash units/acre	Ware Yield (ton/acre) Muriate	Sulphate	MEAN
	(±0.53)		(±0.37)
0	9.2	10.1	9.7
100	12.0	11.0	11.5
200	12.7	11.7	12.2
300	13.7	12.9	13.3
400	13.9	13.4	13.6
500	12.3	13.9	13.1
	(±0.21)		
MEAN	12.3	12.2	

S.E. per plot ± 1.29 (46d.f.) or 10.5% of G.M.

Response to potash was clear up to at least 300 units/acre with both muriate and sulphate of potash. Beyond this level sulphate continued to give a small response but with muriate the final increment from 400 to 500 units gave a depression of 1.6 ton/acre. It appears that at 500 units/acre the depression of early growth outweighed any benefit from extra potash. If this level of fertilizer is justified it will obviously need more thorough incorporation or perhaps autumn application if the muriate form is to be used. Once again, increasing the level of potash particularly as muriate increased the waste yield (Appendix 2) but on this variety, nitrogen had no significant effect.

The analysis of tubers showed that in the case of Désirée as with Pentland Crown there was an increased uptake of magnesium at the higher levels of potash as shown in table 4. In this case the ratio of potash to magnesium tended to be rather below 20:1

Table 4 Analysis of tubers(mean of muriate and sulphate)

Level of Potash units/acre	% potassium	% magnesium
0	1.33	0.078
100	1.51	0.078
200	1.61	0 083
300	1.72	0.090
400	1.89	0.090
500	1.98	0.100

It is interesting that haulm growth, tuber analysis and yield responses indicate that perhaps the variety Désirée is not capable of extracting potash from deficient soils as easily as does Pentland Crown.

The effects of treatment on the specific gravity and dry matter of Désirée tubers were less distinct than those seen with Pentland Crown because of the greater complication of early senescence of Désirée particularly at the low rates of potash application. In general, early senescence produced a low dry matter. The dry matter increased as treatments allowed the crop to mature but there was again a reduction in dry matter at the higher levels of potash.

Damage assessments were made on this variety in the same way as on the Pentland Crown and the variety behaved in a very similar manner except that the overall level of damage was about 35% less and the difference between muriate and sulphate of potash was not detected as regularly. Plant establishment was not as uniform in the Désirée trial as in the Pentland Crown trial and this is believed to have been

responsible for higher errors throughout the trial.

Table 5 shows the damage assessment made on the middle ware fraction and indicates an overall reduction of 41% in the number of bruises when muriate of potash was increased from 0 to 500 units per acre. The reduction when sulphate of potash was used was insufficient to be clearly apparent.

Table 5 Total Bruises per tuber on 2¼ - 2¾ in sample

Level of Potash units/acre	Bruises/tuber Muriate	Sulphate	MEAN
	(±0.399)		(±0282)
0	5.49	3.47	4.48
100	4.05	4.78	4.42
200	3.34	3.28	3.31
300	3.56	4.30	3.93
400	3.07	3.52	3.30
500	3.24	3.26	3.25
	(±0.163)		
MEAN	3.79	3.77	

S.E. Per plot ±0.978 (46 d.f.) or 25.9% of G.M.

When weighted for the proportions of tubers in each size fraction the overall result expressed as bruises per lb of produce is given in table 6. The overall reduction in bruising by using 500 units of potash was 38% when compared with Nil potash and 18% when compared with 200 units/acre.

Table 6 Bruises per Pound of Ware Crop

Level of Potash units/acre	Bruises/lb Muriate	Sulphate	MEAN
0	12.89	10.95	11.92
100	9.86	11.27	10.57
200	9.10	9.54	9.32
300	8.66	9.08	8.87
400	8.10	8.81	8.46
500	7.24	8.16	7.70
MEAN	9.31	9.64	

Conclusions

After only one year of the trial it is too early to make clear recommendations or to explain with confidence the reasons for some of the results obtained in 1973 but certain trends are already evident.

Under the dry soil conditions prevailing at the time of planting muriate of potash even at modest rates depressed early growth but sulphate showed no detrimental affects. Ware yields of both varieties were increased by 1.8 ton/acre following the first increment from 0 to 100 units potash/acre. Smaller but significant increases were obtained up to 200 units/acre with Pentland Crown and 300 units/acre with Désirée. Beyond these levels no significant increases were found and in some cases a yield depression followed the highest levels of muriate of potash.

In general the dry matter of the tubers was reduced by increasing the level of fertilizer potash and muriate of potash consistently produced tubers of lower dry matter than those produced in the presence of sulphate of potash.

Susceptibility to mechanical damage either as direct tissue wounds or internal blackspot was reduced by increasing levels of

potash fertilizer applied in this experiment. Muriate of potash caused a greater improvement than sulphate of potash but there was a frequent indication that sulphate performed relatively better in this respect in the presence of the higher rate of nitrogen. This indicates that sulphate could perhaps be superior in a fenland situation but on the sandy clay loam at this site the highest level of muriate of potash and lower level of nitrogen gave the greatest freedom from damage. However, this treatment did not provide the highest yield although perhaps the situation could be changed by an earlier application of the fertilizer where heavy levels were needed for optimum yield.

PENTLAND CROWN - 805 ML

Appendix I Total Yield

Level of Potash units/acre	Total Yield (ton/acre) Muriate	Sulphate	MEAN
	(±0.57)		(±0.40)
0	16.2	14.2	15.2
100	18.4	17.5	17.9
200	19.0	18.9	19.0
300	19.3	18.9	19.1
400	18.6	18.9	18.7
500	19.0	19.0	19.0
MEAN	(±0.23)		
	18.4	17.9	

SE per plot ±1.40 (46d.f.) or 7.7% of G.M.

Appendix 2 Total Waste Yield

N.B. This does not include the $1\frac{1}{4}$-$1\frac{3}{4}$in. fraction which could be used as seed.

Level of Potash units/acre	Waste Yield(ton/acre) Muriate	Sulphate	MEAN
	(±0.20)		(±0.140)
0	1.8	1.8	1.8
100	3.1	2.6	2.8
200	3.0	2.7	2.8
300	2.9	2.8	2.9
400	3.5	2.8	3.1
500	4.2	2.6	3.4
MEAN	(±0.081)		
	3.1	2.6	

S.E. per plot ±0.49 (46d.f.) or 17.3% of G.M.

Appendix 3 Total Bruises per tuber on $1\frac{3}{4}$-$2\frac{1}{4}$in. sample

Level of Potash units/acre	Bruises/tuber Muriate	Sulphate	MEAN
	(±0.398)		(±0.281)
0	4.70	4.00	4.35
100	3.61	4.83	4.22
200	3.77	4.10	3.93
300	2.82	4.22	3.52
400	2.34	3.30	2.82
500	2.30	2.87	2.58
MEAN	(±0.162)		
	3.26	3.89	

S.E. per plot ±0.975 (46d.f.) or 27.3% of G.M.

Appendix 4 - Total Bruises per tuber on $2\frac{3}{4}$-$3\frac{1}{4}$in. sample

Level of Potash units/acre	Bruises/tuber Muriate	Sulphate	MEAN
	(±0.622)		(±0.440)
0	8.69	9.88	9.28
100	8.78	9.65	9.22
200	8.29	8.55	8.42
300	7.74	8.61	8.17
400	7.04	8.43	7.74
500	6.64	6.67	6.65
MEAN	(±0.254)		
	7.86	8.63	

S.E. per plot ±1.523 (46d.f.) or 18.5% of G.M.

DESIREE 805 ML

Appendix I Total Yield

Level of Potash units/acre	Total Yield (ton/acre) Muriate	Sulphate	MEAN
	(±0.55)		(±0.39)
0	10.5	11.5	11.0
100	13.3	12.6	12.9
200	14.2	13.0	13.6
300	15.1	14.4	14.8
400	15.3	14.9	15.1
500	13.9	15.5	14.7
	(±0.23)		
MEAN	13.7	13.7	

S.E. per plot ±1.348 (46d.f.) or 9.8% of G.M.

Appendix 2 Total Waste Yield

N.B. This does not include the $1\frac{1}{4}$-$1\frac{3}{4}$in. fraction which could be used as seed.

Level of Potash units/acre	Waste Yield Muriate	Sulphate	MEAN
	(±0.11)		(±0.08)
0	0.2	0.2	0.2
100	0.3	0.5	0.4
200	0.6	0.3	0.5
300	0.6	0.4	0.5
400	0.7	0.6	0.6
500	1.0	0.4	0.7
	(±0.05)		
MEAN	0.6	0.4	

S.E. per plot ±0.28 (46d.f.) or 58.2% of G.M.

Appendix 3 Total Bruises per tuber on $1\frac{3}{4}$-$2\frac{1}{4}$in. sample

Level of Potash units/acre	Bruises/tuber Muriate	Sulphate	MEAN
	(±0.290)		(±0.205)
0	2.94	2.75	2.85
100	2.23	2.62	2.43
200	2.30	2.34	2.32
300	2.13	1.89	2.01
400	2.11	2.06	2.08
500	1.82	1.92	1.87
	(±0.118)		
MEAN	2.26	2.26	

S.E. per plot ±0.709 (46d.f.) or 31.4% of G.M.

Appendix 4 Total Bruises per tuber on $2\frac{3}{4}$-$3\frac{1}{2}$in sample

Level of Potash units/acre	Bruises/Tuber Muriate	Sulphate	MEAN
	(±0.543)		(±0.384)
0	5.65	5.35	5.50
100	6.39	4.63	5.51
200	4.99	5.30	5.14
300	4.25	5.38	4.82
400	4.46	5.07	4.76
500	3.14	4.14	3.64
	(±0.222)		
MEAN	4.82	4.96	

S.E. per plot ±1.331 (46d.f.) or 27.2% of G.M.