ROTHAMSTED RESEARCH

Report for 1934

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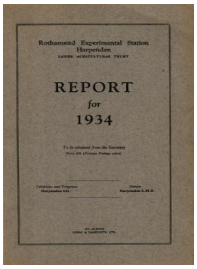

Special Groups of Experiments

Rothamsted Research

Rothamsted Research (1935) *Special Groups of Experiments ;* Report For 1934, pp 206 - 226 **- DOI: https://doi.org/10.23637/ERADOC-1-66**

EXPERIMENTS ON POULTRY MANURE

Centres	Type of Experiment	No. of plots
Rothamsted (see pp. 191-2 for details)	2a	48
Woburn (A) (see pp. 195-6 for details)	3a	48
Woburn (B) (see p. 202 for details)	2a	48
Lady Manner's School, Bakewell (A)	1	16
Lady Manner's School, Bakewell (B)	1	16
A. J. Butler, Esq., Bromham House, Bromham, Wilts	1a	25
Grammar School, Burford	1	16
T. Hughes, Esq., Chittoe, Wilts	2	24
Avoncroft College, Evesham	1a	25
Fakenham School, Norfolk	1	16
County School, Godalming, Surrey	1	16
F. Minney, Esq., Harrowden, Bedford, J. W. Dallas, Esq., County Organiser	1a	25
Messrs. Davies and Davies, West End, Haynes, Beds. J. W. Dallas, Esq., County Organiser	1a	25
Messrs. Spencer Thomas, Honeydon, Beds. J. W. Dallas, Esq., County Organiser	3	32
Sailors' Orphan Homes School, Newlands, Hull	1	16
G. Cartridge, Esq., Bradford House, Kidderminster, Worcs.	1a	25
Kinmel School, Abergele, Denbighshire	1	16
E. W. Street, Esq., Langford, Beds.	1a	25
Agricultural and Horticultural Research Station, Long Ashton, Bristol	2	36
Cheshire School of Agriculture, Reaseheath, Nantwich, Cheshire (A)	1a	25
Cheshire School of Agriculture, Reaseheath, Nantwich, Cheshire (B)	1a	25
The High School, Newcastle, Staffs	1	16
Capt. Hamilton, Pauntley Court, Newent, Glos.	1a	25
Harper Adams Agricultural College, Newport, Salop	1a	25
Norton New Council School, Doncaster, York	1	16
Hertfordshire Farm Institute, Oaklands, St. Albans	2a	27
G. McCrae, Esq., Gillibrand Farm, Skelmersdale, Ormskirk, Lancs. J. J. Green, Esq., County Organiser	1a	25
Oundle School, Peterborough	1	20
Worcester County Experimental Station, Perdiswell. R. C. Gaut, Esq., County Organiser	2	24
T. H. Ream, Esq., Portobello Farm, near Potton	3	32
Messrs. Smith Bros., Stratford, Sandy (A). J. W. Dallas, Esq., County Organiser	1a	25
Messrs. Smith Bros., Stratford, Sandy (B). J. W. Dallas, Esq., County Organiser	1a	25
Church of England School, Staindrop, Darlington, co. Durham	1	16
J. Bonner, Esq., Steppingley, Beds.	2	24*
County School, Welshpool, Montgomeryshire (A)	1	16
County School, Welshpool, Montgomeryshire (B)	1	16
R. S. Maudlin, Esq., Wyboston. J. W. Dallas, Esq., County Organiser	2	24
South-Eastern Agricultural College, Wye, Kent	2	36

* Two blocks of this experiment failed and only 12 plots were analysed.

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Experimental arrangements

(1) All combinations of $\left\{\begin{matrix}O\\PM\end{matrix}\right\}\times\left\{\begin{matrix}O\\S/A\end{matrix}\right\}$
4 × 4 Latin squares or randomised blocks.
Basal manuring : 1.0 cwt. K_2O and 1.2 cwt. P_2O_5 per acre.

(1*a*) As (1), with malt culms, rape cake, rape meal or meat manure as an additional treatment.
5 × 5 Latin squares or randomised blocks.
Basal manuring : 1.0 cwt. K_2O and 1.0 cwt. P_2O_5 per acre, except Evesham (1.2 cwt. P_2O_5).

(2) 0, 1 and 2 levels of S/A and P.M.
Randomised blocks.
Basal manuring : 1.0 cwt. K_2O and 1.0 cwt. P_2O_5 per acre, except Wyboston (1.2 cwt. P_2O_5).
Long Ashton (strawberries) also received 10 tons F.Y.M. per acre.

(2*a*) 0, 1 and 2 levels of S/A, P.M., soot and rape dust.
Randomised blocks.
Basal manuring : 1.0 cwt. K_2O and 1.0 cwt. P_2O_5 per acre.

(3)* All combinations of $\left\{\begin{matrix}O\\P.M.\end{matrix}\right\}\times\left\{\begin{matrix}O\\S/A\end{matrix}\right\}\times\left\{\begin{matrix}O\\Super.\end{matrix}\right\}$
Randomised blocks, second order interaction confounded.
Basal manuring : 1 cwt. K_2O per acre.

(3*a*)*As (3) with plots split for sulphate of ammonia.

Rates of manuring

(1) and (1*a*) N at the rate of 0, 0.6 and 1.2 cwt. per acre except Bromham, Kidderminster and Newent (0, 0.5 and 1.0 cwt. N. per acre).

(2) and (2*a*) N at the rate of 0, 0.4 and 0.8 cwt. per acre, except Chittoe, Perdiswell and Oaklands (0, 0.3 and 0.6 cwt. N per acre).

(3) N at the rate of 0 and 0.6 cwt. N per acre. P_2O_5 at the rate of 0 and 0.5 cwt. per acre.
(3*a*) N and P_2O_5 at the rate of 0 and 0.6 cwt. per acre applied in 1933. N at the rate of 0 and 0.2 cwt. per acre applied in 1934.

Note: In order to minimise the action of the phosphate in the manure, a small supplementary dressing of superphosphate was added to the poultry manure treatments and the other treatments received superphosphate equivalent to the total phosphoric acid in the poultry manure so applied. This does not apply to experiments of type 3.

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* These experiments are a repetition, on the same plots, of the 1933 experiments and are designed to measure cumulative effects.

https://doi.org/10.23637/ERADOC-1-66

Place	Crop	Area Acres	Soil	Variety	Manures applied	Seed sown	Harvested	Previous crop
Bakewell (A)	Kale	2/205	Limestone	Marrow-stem	May 9	May 10	Nov. 7 Jan.9	Potatoes
Bakewell (B)	Potatoes	2/205	Limestone	King Edward	April 22	April 26-May 2	Oct. 3-10	Mangolds
Bromham	Potatoes	1/25	Lower greensand	Arran Consul	April 24	April 26	Oct. 22	Swedes and turnips
Burford	,,	1/120	Limestone loam	King George	May 6-8	April 28-30	Sept. 24-29	Permanent grass
Chittoe	,,	1/24	Lower greensand	Great Scot	April 17	April 18	Oct. 29	Potatoes
Evesham	Peas	1/80	Light loam	Senator	March 28	March 28	July 4	Sprouts
Fakenham	Potatoes	1/302	Sandy loam	Majestic	March 25	April 2 & 3	Sept. 20-25	Potatoes
Godalming	,,	1/239	Sandy	Arran Banner	April 8	April 7-9	Sept. 12-15	Potatoes
Harrowden	,,	1/50	Silty gravel	King Edward	April 10	April 19	Oct. 19	Spring oats
Haynes	Peas	1/50	Sandy clay	Thomas Laxton	March 25	March 26	June 28	Savoys
Honeydon	Potatoes	1/50	Boulder clay	King Edward	April 25	April 23	Nov. 6	Sprouts
Hull	Swedes	1/227	Heavy alluvium	ConquerorGreenTop	April 20	May 10	Oct. 23	Vegetables
Kidderminster	Sugar beet	1/40	Sandy loam	Kleinwanzleben E	April 17	May 10	Nov. 29-30	Beans
Kinmel	Potatoes	1/67	Light loam	Kerr's Pink	April 26	May 3	Nov. 8	Potatoes
Langford	Peas	1/50	Silt gravel	Thomas Laxton	Feb. 23	Feb. 28	June 25	Potatoes
Long Ashton	Strawberries	1/145	Sandy loam	Royal Sovereign	April 4	September	June 13-July 2	Strawberries
Nantwich (A)	Kale	1/90	Light loam	Marrow-stem	May 15	May 17-June 8	Dec. 4-7	Silage
Nantwich (B)	Onions	1/134	Light soil	Bedfordshire Champion	April 10	April 17	Sept. 7	Vegetables

Place	Crop	Area Acres	Soil	Variety	Manures applied	Seed sown	Harvested	Previous crop
Newcastle	Potatoes	1/415	Old garden	Majestic	March 23	March 25-27	Dec. 8-15	Potatoes
Newent	,,	1/40	Sandy soil	King Edward	May 11-12	May 17	Oct. 18	Wheat
Newport	Savoys	1/80	Medium loam	Ormskirk	May 17	May 18	Nov.-Dec.	Oats
Norton	Potatoes	1/316	Medium loam	Majestic	April 16	April 16	Sept. 4	Potatoes
Oaklands	Sprouts	1/58	Gravelly loam	New Dwarf	July 6	June 15	Oct. 15-Feb. 11	Rye for silage*
Ormskirk	Potatoes	1/80	Medium loam	Great Scot	April 30	April 30	Nov. 15	Oats
Oundle	,,	1/70	Clay loam	Majestic	May 22	April 18	Oct. 18	Wheat
Perdiswell	Sugar beet	1/40	Alluvial loam	Kleinwanzleben E	April 18	May 9	Nov. 12-13	Runner beans
Potton	Potatoes	1/50	Sandy	Eclipse	March 9	March 10	Aug. 23-24	Sprouts
Sandy (A)†	,,	1/90	Brown sand	Ninetyfold	March 13	March 24	June 19	Cabbages
Sandy (B)	Sugar beet	1/75	Brown sand	Kuhn	March 13	April 16	Nov. 28	Cabbages
Staindrop	Potatoes	1/160	Loam	Great Scot	May 3	May 3	Sept. 12	Potatoes
Steppingley‡	Cabbages	1/50	Sandy loam	Cooper's Matchless	July 25 & Oct. 16	July 27	May 2	Peas
Welshpool (A)	Potatoes	1/200	Wenlock shale	Great Scot	May 15	May 15	Sept. 28	Potatoes
Welshpool (B)	Swedes	1/160	Medium loam	Lord Derby	May 28	June 22	Nov. 22-26	Swedes
Wyboston**	Sprouts	1/50	Silty gravel	A local strain	April 16 July 2, 31	?	Oct. 23-Feb. 20	Wheat
Wye	Onions	1/100	Deep loam	Ronsham Park Hero	April 10	April 12	Sept. 21	Potatoes

* Silage cut May, 1934. Previous crop : Winter oats.
† Low yield due to drought and virus infection. . .
‡ Plots irregular owing to poor germination and damage by rabbits.
** The double dressings produced large rough sprouts that should have been harvested earlier than the rest.

Summary

Types 1 *and* 1a

Place	Crop	No nitrogen	Poultry manure	Sulph. amm.	Poultry manure and sulph. amm.	Other organic fertiliser	*Mean*	St. error	*Mean response to N*†	P.M.-S/A	
										Per cent. of Mean response	St. error
Bakewell (B) ..	Potatoes: tons per acre	5.37	4.95	5.67	5.44		*5.36*	±0.200	*−0.06*		
Burford ..	,, ,, ,,	9.24	8.72	7.67	8.22		*8.46*	±0.430	*−1.04*		
Fakenham	,, ,, ,,	7.28	7.50	8.19	8.82		*7.95*	±0.709	*+0.56*		
Godalming	,, ,, ,,	11.54	13.54	14.10	14.31		*13.37*	±0.272	*+2.28*	−24.6	±17.2
Kinmel ..	,, ,, ,,	11.17	12.73	15.02	13.81		*13.18*	±0.638	*+2.70*	−84.8	±41.5
Newcastle	,, ,, ,,	13.31	14.03	14.14	14.47		*13.99*	±0.444	*+0.77*		
Norton ..	,, ,, ,,	7.68	8.58	10.28	10.52		*9.26*	±0.502	*+1.75*	−97.1	±53.0
Oundle ..	,, ,, ,,	11.41	11.94	13.55	11.05		*11.99*	±0.812	*+1.34*		
Staindrop	,, ,, ,,	7.32	7.46	9.00	9.75		*8.38*	±0.657	*+0.91*		
Welshpool (A) ..	,, ,, ,,	6.70	7.25	7.72	8.30		*7.49*	±0.250	*+0.78*		
Bromham	,, ,, ,,	13.63	14.20	14.85	16.09	14.15[1]	*14.58*	±0.387	*+0.90*		
Harrowden	,, ,, ,,	8.10	9.18	9.14	8.66	8.45[2]	*8.71*	±0.288	*+1.06*	+3.8	±38.4
Newent ..	,, ,, ,,	9.80	10.40	10.90	11.37	9.86[3]	*10.47*	±0.195	*+0.85*	−58.8	±36.4
Ormskirk	,, ,, ,,	5.17	6.90	7.38	8.34	7.69[4]	*7.10*	±0.259	*+1.97*	−24.4	±19.0
Sandy (A)	,, ,, ,,	1.96	1.99	2.02	2.14	2.10[2]	*2.04*	±0.052	*+0.04*		
Mean of potato experiments ..		*8.65*	*9.29*	*9.98*	*10.09*		*9.50*	*±0.118*			
Staindrop	Per cent. ware ‡	98.1	97.8	97.4	96.6		*97.5*	±0.299	*−0.5*		
Bromham	,, ,, *	82.1	83.5	89.7	85.0	80.3[1]	*84.1*	±1.84	*+4.5*	−137.8	±90.0
Harrowden	,, ,, **	64.8	66.2	65.7	61.1	61.5[2]	*63.9*	±1.92	*+1.2*		
Ormskirk	,, ,, **	89.3	87.9	92.0	90.8	92.3[4]	*90.5*	±1.06	*+0.6*		

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Place	Crop	No N.	P.M.	S/A	P.M. S/A	Other Org.	Mean	St. error	N res.	P.M.-S/A %	P.M.-S/A S.E.
Hull ..	Swedes : tons	13.53	13.93	15.10	15.58		*14.54*	±0.851	*+0.98*		
Welshpool (B) ..	,, ,, ,,	10.71	11.21	11.46	11.04		*11.10*	±0.294	*+0.62*		
Kidder-minster	Sugar beet.										
	Roots : tons	15.81	17.53	17.56	17.77	18.54[1]	*17.44*	±0.420	*+1.74*	−1.7	±34.1
	Tops : ,,	10.53	12.27	12.69	13.68	13.05[1]	*12.44*	±0.352	*+1.95*	−21.5	±26.0
	Sugar percent.	16.7	16.5	16.6	16.4	16.6[1]	*16.6*	±0.131	*−0.2*		
	Total sugar:cwt.	52.8	57.8	58.3	58.3	61.6[1]	*57.8*		*+5.2*		
Sandy (B)	Sugar beet.										
	Roots : tons	10.41	11.77	11.22	12.32	11.33[2]	*11.41*	±0.407	*+1.08*		
	Tops : ,,	7.09	9.28	9.87	11.40	9.62[2]	*9.45*	±0.549	*+2.49*	−23.7	±31.8
	Sugar percent.	17.79	17.86	17.41	17.22	17.73[2]	*17.60*		*−0.16*		
	Total sugar:cwt.	37.0	42.0	39.1	42.4	40.2[2]	*40.1*		*+3.6*		
Nantwich (B)	Onions : tons per acre ..	11.38	11.49	11.32	11.58	10.40[2]	*11.23*	±0.319	*+0.02*		
Bakewell (A)	Kale : tons per acre	20.91	20.66	23.22	23.61		*22.10*	±0.520	*+1.03*		
Nantwich (A)	,, ,, ,,	16.66	16.84	16.90	16.17	16.20[2]	*16.55*	±0.669	+0.21		
Newport	Savoys : tons per acre ..	15.82	19. 76	23.24	23.61	20.83[5]	*20.65*	±0.896	*+5.68*	−61.3	±25.2
Evesham	Peas : cwt. per acre	76.9	75.7	80.9	81.6	70.1[2]	*77.0*	±1.66	+1.4		
Haynes	,, ,, ,,	45.4	50.8	44.2	46.2	47.2[2]	*46.8*	±3.14	+2.1		
Langford	,, ,, ,,	97.5	93.4	93.9	92.9[6]	91.7[2]	*93.9*	±1.30	*−3.8*		
	Haulms ,,	77.0	74.1	79.9	76.4[6]	75.1[2]	*76.5*	±0.971	*0.0*		

[1] Fish manure. [2] Malt culms. [3] Meat manure. [4] Rape cake. [5] Rape meal. [6] Poultry manure and malt culms. * Size of riddle not recorded. ** 1½-inch riddle. † The average of the responses to P.M. and S/A alone. ‡ Potatoes hand sorted.

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Summary
Type 2

Place.	Crop.	No nitrogen	1 Poultry manure	2 Poultry manure	1 Sulph. amm.	2 Sulph. amm.	*Mean*	St. error
Chittoe	Potatoes : tons per acre	10.36[1]	11.40	11.69	11.89	12.43	*11.36*	±0.454
	Percentage ware*	86.2[2]	85.0	84.7	84.5.	83.8	85.1	±1.69
Perdiswell	Sugar beet : Roots : tons	11.39[3]	12.23	9.52	10.44	9.60	*10.76*	±1.27
	Tops : tons	6.90[4]	8.59	6.36	6.49	6.15	*6.90*	±1.59
	Sugar percentage	17.2[5]	17.0	17.2	16.9	17.0	*17.1*	±0.201
	Total sugar : cwt.	39.2	41.6	32.7	35.3	32.6	*36.8*	
Wye	Onions : tons per acre	3.72[6]	3.52	3.76	3.69	3.32	*3.62*	±0.298
Wyboston ..	Brussels sprouts : cwt.							
	1st harvesting	23.4	24.8	25.7	24.9	26.6	*24.8*	
	2nd harvesting	17.2	18.9	20.2	22.8	26.7	*20.5*	
	3rd. harvesting	16.7	18.0	19.0	21.2	20.3	*18.6*	
	Total	57.3[7]	61.7	64.9	68.9	73.6	*63.9*	±1.25
	Unsaleable	2.7	4.0	4.7	3.8	4.6	*3.8*	
Steppingley	Spring cabbages : tons	5.09[8]	5.74	6.05	6.26	7.96	*6.03*	±0.684
Long Ashton	Strawberries : cwt.	18.7[9]	20.2	19.9	15.9	14.1	*17.9*	±2.16

STANDARD ERRORS : (1) ±0.321. (2) ±1.20, (3) ±0.898, (4) ±1.12, (5) ±0.142, (6) ±0.211, (7) ±0·884, (8) ±0.483, (9) ±1.53.
* 1½ inch riddle.

Summary
Type 2a

Place.	Crop.	No nitrogen	1 Poultry manure	2 Poultry manure	1 Sulph. amm.	2 Sulph. amm.	1 Soot	2 Soot	*Mean*	St. error
Oaklands	Brussels sprouts : cwt									
	1 st. harvesting	8.5	10.6	13.4	20.6	25.7	14.2	13.6	*13.7*	
	2nd. harvesting	23.5	24.8	25.9	22.6	25.0	24.9	24.8	*24.3*	
	3rd. harvesting	4.5	4.8	5.4	6.4	6.7	5.1	5.1	*5.2*	
	Total saleable	36.5[1]	40.2	44.7	49.6	57.4	44.2	43.5	*43.2*	±0.866
	Unsalable	5.1	5.3	5.5	5.9	6.3	6.0	5.1	*5.5*	

STANDARD ERROR : (1) ±0.500.

Yields of separate treatments
Type 3

Place.	Crop.	Sub-blocks A.				Sub-blocks B.			
		No nitrogen	Sulph. amm. super.	Poultry manure super.	Poultry manure sulph. amm.	Poultry manure	Sulph. amm.	Super.	Poultry manure super. sulph. amm.
Honeydon	Potatoes : tons per acre	6.96	10.28	9.45	8.63	7.62	7.70	8.99	11.35
	Percentage ware*	88.8	88.7	86.8	88.8	88.2	88.5	87.0	88.7
Potton ..	Potatoes : tons per acre	4.58	6.24	6.65	6.85	6.18	5.64	4.68	6.66
	Percentage ware†	59.3	69.9	70.4	71.8	66.7	66.8	61.7	70.0

* 1½ inch riddle. † 1⅝ inch riddle.

Average effects and interactions
Type 3

Place.	Crop.	*Mean yield*	N.	P.	PM	St. error	N×P*	N×PM*	P×PM*	St. error
Honeydon	Potatoes : tons per acre	*8.87*	+1.24	+2.29	+0.78	±0.443	+0.72	+0.44	−0.03	±0.886
	Percentage ware	*88.2*	+0.98	−0.78	−0.12	±0.771	+1.65	+0.55	+0.05	±1.54
Potton	Potatoes : tons per acre	*5.94*	+0.82	+0.24	+1.30	±0.113	−0.08	−0.97	−0.21	±0.226
	Percentage ware	*67.1*	+5.10	+1.85	+5.30	±1.49	−2.40	−5.50	−1.80	±2.98

* Old convention as to factor ½ (see page 128).

Conclusions

Types 1 and 1a

Poultry manure and sulphate of ammonia alone and in combination.

In potatoes, sulphate of ammonia alone gave a significant response at 8 of the 15 centres, poultry manure at 4, and the combined dressing at 9. Sulphate of ammonia alone gave a significantly higher yield than poultry manure alone at Bakewell, Kinmel and Norton, though at Bakewell neither gave yields significantly different from those on the plots without nitrogen. At Burford nitrogen produced an almost significant decrease in yield, there being no significant differences between the yields due to the different dressings. The average responses to sulphate of ammonia alone and to poultry manure alone were both significant, that due to sulphate of ammonia being significantly greater than that due to poultry manure. The differences in response (poultry manure minus sulphate of ammonia) are shown above as a percentage of the mean response at those stations at which there was a clear response to nitrogen. The effects of poultry manure on percentage ware were not significant at any of the four stations at which ware was recorded; at Bromham sulphate of ammonia gave a significant increase, which was greater than the corresponding increase due to poultry manure. At Staindrop both poultry manure and sulphate of ammonia decreased percentage ware, the decrease with sulphate of ammonia being significant, though not significantly different from that with poultry manure.

Of the remaining crops, swedes and onions showed no significant responses to poultry manure or sulphate of ammonia. Malt culms significantly depressed the yield of onions at Nantwich. For sugar beet, poultry manure gave significant increases in roots and tops at both centres, as did also sulphate of ammonia except for roots at Sandy, the differences between the responses to the fertilisers being in all cases small. Sulphate of ammonia gave a significant increase in the yield of kale at Bakewell, there being no response to poultry manure. There were no responses in kale at Nantwich. There were significant increases in savoys at Newport to sulphate of ammonia, poultry manure and rape meal; the response to sulphate of ammonia was significantly greater than that due to poultry manure, rape meal occupying an intermediate position.

Sulphate of ammonia significantly increased the yield of peas at Evesham, and gave a significantly higher yield than poultry manure. Malt culms produced a significant depression in yield. There were no significant effects on peas at Haynes. At Langford, nitrogen produced a significant depression in the yield of peas, there being no significant differences between the effects of the four dressings. Sulphate of ammonia gave a significantly higher yield of haulms than poultry manure or malt culms, though none of the three dressings gave yields significantly different from that with no nitrogen.

Conclusions

Types 2 and 2a

Single and double dressings of poultry manure and sulphate of ammonia.

At Chittoe the response in yield of potatoes to sulphate of ammonia was significant and that to poultry manure almost significant, the two responses not being significantly different. Both manures reduced percentage ware, but the reductions were not significant.

There were no significant effects on sugar beet at Perdiswell, onions at Wye or strawberries at Long Ashton.

Both single and double dressings of poultry manure and sulphate of ammonia gave significant increases in the yields of sprouts at Wyboston and Oaklands. The response to sulphate of ammonia was much larger in both cases. Both dressings of soot at Oaklands gave about the same yield, this being about the same as that of the double dressing of poultry manure.

Spring cabbages showed a significant response to sulphate of ammonia, though not to poultry manure. The differences between the responses was, however, not significant.

Conclusions

Type 3

Cumulative experiments.

The response in yield of potatoes to sulphate of ammonia was significant at both centres, that to poultry manure at Potton and that to superphosphate at Honeydon being also significant. The responses to sulphate of ammonia and poultry manure did not, however, differ significantly at Honeydon, while poultry manure gave a significantly higher yield at Potton. Sulphate of ammonia and poultry manure gave significant increases in percentage ware at Potton.

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SUGAR BEET FERTILISER EXPERIMENTS

FACTORY SERIES

SYSTEM OF REPLICATION : Bardney, Brigg and Wissington : 6 randomised blocks of 9 plots each. Remainder : 3 randomised blocks of 9 plots each. At Bardney, Brigg and Wissington four degrees of freedom were partially confounded and at the remainder two degrees of freedom were completely confounded with block differences, the degrees of freedom in each case representing second order interactions.

AREA OF EACH PLOT : Bury, Cantley, Colwick, Ipswich and Newark : 1/10 acre. Ely, Felstead, Peterborough and Poppleton : 1/20 acre. Allscott, Bardney, Brigg, King's Lynn and Wissington : 1/40 acre. Oaklands : 1/149 acre.

TREATMENTS : All combinations of :

{ No sulph. amm. (N_0) ; 2 cwt. sulph. amm. (0.4 cwt. N) (N_1) ; 4 cwt. sulph. amm. (0.8 cwt. N) (N_2) } × { No super. (P_0) ; 3 cwt. super. (0.5 cwt. P_2O_5) (P_1) ; 6 cwt. super. (1.0 cwt. P_2O_5) (P_2) } × { No mur. pot. (K_0) ; 1½ cwt. mur. pot. (0.6 cwt. K_2O) (K_1) ; 2½ cwt. mur. pot. (1.2 cwt. K_2O) (K_2) }

VARIETIES : Allscott : Sharpes. Cantley and Newark : Kuhn E. Ely : Kleinwanzleben N. King's Lynn : Marsters. Remainder : Kleinwanzleben E.

Mechanical and chemical analyses of soil samples from each experiment have been carried out.

	Station	Soil	Previous crop	Date of sowing	Date of lifting	Farming notes
1	Allscott ..	Sandy	Swedes	May 22	Nov. 27	Swedes received dung. 1 ton quick lime per acre on May 14.
2	Bardney ..	Limestone loam	Wheat	Apr. 12	Oct. 22	Nitrogen plots got away quicker than the rest.
3	Brigg ..	Light loam	Wheat	Apr. 10	Oct. 24	4 plots badly damaged by wind in early spring.
4	Bury ..	Light loam	Beet	May 10	Nov. 2	
5	Cantley ..	Sandy loam	Potatoes	Apr. 18	Oct. 15	
6	Colwick ..	Humus sand	Wheat	Apr. 17	Oct. 10	Rather thin plant. Good supply of soil moisture.
7	Ely	Heavy fen	Beet	May 11	Dec. 7	
8	Felstead ..	Chalky boulder clay	Oats	May 1	Oct. 28	
9	Ipswich ..	Light loam	Oats	Apr. 30	Nov. 30	Some wire worm damage.
10	King's Lynn	Heavy silt	Potatoes	Apr. 20	Nov. 2	Very heavy crop. Excellently farmed.
11	Newark ..	Sandy loam	Wheat	May 1	Nov. 14	Soil very uniform.
12	Oaklands ..	Light gravelly loam	Wheat	Apr. 30	Oct. 21	15 tons dung to beet. Crop suffered from drought. Tops very small.
13	Peterborough	Black fen on clay	Potatoes	May 5	Jan. 15	Very vigorous crop. No sign of water shortage. Some springtail damage.
14	Poppleton ..	Light loam	Wheat	May 1	Oct. 4	Wheat had 20 tons dung. Land gyro-tilled for beet.
15	Wissington ..	Gravelly loam	Wheat	Apr. 13	Nov. 12	

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Plant density (mean values)

	Station	Yield in tons per acre	Plants in thousands per acre	Distance in inches between rows	Weight of roots in lb. per plant	Increase in yield, in lb. for one additional beet	S.E. per plot: tons per acre Before	S.E. per plot: tons per acre After adjusting for plant number
1	Allscott	10.97	19.8	20.5	1.24	0.72	±1.10	±1.14
2	Bardney	11.44	26.6	18.0	0.96	0.36	±0.86	±0.84
3	Brigg	13.42	29.3	18.0	1.03	0.99	±1.81	±0.80
4	Bury	13.83	28.4	21.2	1.09	−1.56	±0.74	±0.71
5	Cantley	12.90	28.2	17.0	1.02	5.04	±0.96	±0.90
6	Colwick	10.12	22.5	21.7	1.01	0.60	±0.61	±0.62
7	Ely	12.46	23.5	21.5	1.19	0.32	±1.88	±1.94
8	Felstead	11.28	25.6	22.7	0.99	1.86	±0.76	±0.75
9	Ipswich	12.45	23.8	21.0	1.17	2.57	±0.73	±0.51
10	King's Lynn	19.54	39.6	18.5	1.10	0.66	±1.02	±0.97
11	Newark	14.10	29.9	21.2	1.06	−0.02	±0.42	±0.44
13	Peterborough ..	17.99	29.2	18.7	1.38	5.93	±1.31	±1.25
14	Poppleton	14.21	33.4	22.3	0.95	−1.86	±0.76	±0.63
15	Wissington	14.55	24.0	18.0	1.36	1.15	±1.33	±1.15

Sampling errors in sampling for sugar content
(10 *roots in each sample*)

	Station	No. of samples analysed per plot	Standard error per sample
11	Newark ..	2	0.57
14	Poppleton ..	4	0.32
15	Wissington	4	0.32

Significant Responses

1933

		N	P	K	N×P	N×K	P×K
Roots	(13)	+*	0	+*	0	−	0
Tops	(5)	+*	0	0	0	0	0
Sugar %	(13)	−	0	+	0	0	0
Plant No.	(5)	0	0	0	0	0	−*
Purity %	(1)	−	+	0	0	0	0

1934

		N	P	K	N×P	N×K	P×K
Roots	(15)	+*	+	0	0	0	0
Tops	(11)	+*	+*	0	0	0*	0
Sugar %	(15)	−*	0*	+*	0	+	+*
Plant No.	(14)	+	0	0	0	0	0*
Purity %	(13)	−*	0	0	0	0	0
			Curvature			Symbols	
Roots ..	..	0	0	0	+ = Positive } Significant		
Tops ..	..	0	0	0	0 = No } Average		
Sugar %	..	0*	0	−	− = Negative } Response		
Plant No.	..	0	0	0	(13) = No. of Centres		
Purity %	..	0	0	0	* = Significant differences between centres.		

In the roots the average response to the second dressing was significantly less than the average response to the first dressing at those centres which showed a response in roots.

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Mean Responses per 1 *cwt. of* N, P_2O_5 *and* K_2O

	N		P		K	
	1933	1934	1933	1934	1933	1934
Roots—tons ..	+0.80	+1.34	+0.18	+0.32	+0.28	−0.05
Tops—tons ..	+2.70	+3.44	+0.28	+0.36	+0.36	−0.08
Sugar % ..	−0.85	−0.52	+0.08	−0.07	+0.30	+0.17
Total Sugar ..	+0.9	+3.7	+0.8	+1.0	+1.5	+0.3
Plant number ..	+0.70	+0.52	+1.18	+0.12	+0.72	+0.14
Purity % ..	−0.8	−1.0	+1.4	+0.0	−0.1	+0.0

Conclusions

Effects of Sulphate of Ammonia

Eight of the fifteen centres gave definitely significant increases in yield of roots while the remaining seven centres showed no appreciable increases.

Only two centres where the tops were weighed failed to show significant increases in the yields of tops (these two centres also showing no response in roots).

Most centres showed a decrease in sugar percentage, but there did not appear to be any correlation of the magnitude of this effect with the yield effects. The significant increase at Felstead is small in absolute magnitude and may be ignored.

Percentage purity is significantly decreased at six of the thirteen stations where it was measured, and slightly decreased at most others.

Plant number is significantly increased at two of the stations and shows a significant average increase.

All the above effects (with the possible exception of plant number) are significantly different for the different stations, this being true of the yield effects even when the stations showing no response are omitted from consideration.

In the roots the average response to the second dressing was significantly less than the average response to the first dressing at those centres which showed a response in roots. This was not the case for those centres where there was no response in roots. The tops, percentage purity and plant number did not show any similar effect. In the sugar percentage the average difference was not significant, but was significantly different at different centres, being significant (negative) at two centres.

Effects of Superphosphate

The roots show a small significant average response, not significantly different at the different centres, but positively correlated with the responses to tops. The tops show significantly different responses at different centres, there being three centres with significant responses, and one with a significant depression. The sugar percentages also show significantly different responses, these being negatively correlated with the responses of tops, i.e., an increase in tops occurs with a decrease of sugar percentage.

There are no significant effects on percentage purity or plant number, nor are there any significant differences between the responses to first and second dressings.

Effects of muriate of Potash

The only significant average response is that of the sugar percentage, which is significantly increased, the increase being significantly different at different centres ; five centres show significant increases and one a significant decrease.

In addition the average response of sugar percentage to the second dressing is significantly less than the average response to the first. (There is no apparent correlation of this difference with the response of sugar percentage to potash.) The same effect is also apparent on the roots, but here differs significantly from centre to centre, the average not being quite significant.

Interactions

Considering the experiments as a whole, there are no significant interactions between sulphate of ammonia and superphosphate.

The sugar percentage shows a significant average positive interaction between sulphate of ammonia and muriate of potash, not significantly different at the different centres. The tops show similar interactions, significantly different, some positive and some negative ; their average value is small. The similar interactions on the roots are not, as a whole, significant.

The sugar percentage also shows a significant average positive interaction between phosphate and potash, significantly different at different centres. (One centre, Oaklands, shows a significant negative interaction, this being the only centre with a significant increase in sugar percentage with phosphate.)

The plant number at Ipswich shows a very strong negative interaction between phosphate and potash. This might be partly accounted for by the position of the plots, but it is worth noting that a similar effect occurred at Allscott last year.

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Yields of

Station	Grouping	$N_0P_0K_0$	$N_0P_0K_1$	$N_0P_0K_2$	$N_0P_1K_0$	$N_0P_1K_1$	$N_0P_1K_2$	$N_0P_2K_0$	$N_0P_2K_1$	$N_0P_2K_2$	$N_1P_0K_0$	$N_1P_0K_1$	$N_1P_0K_2$
													Key to
	I	a	b	c	c	a	b	b	c	a	c	a	b
	II	a	b	c	b	a	b	b	c	a	b	c	a
	III	a	b	c	b	c	a	c	a	b	c	a	b
	IV	a	b	c	c	c	a	c	a	b	b	c	a
													Roots (washed) :
1	I	13.00	10.09	10.86	11.35	11.15	12.90	10.86	12.02	10.84	9.02	10.95	11.13
2	I	11.76	9.92	10.69	9.30	11.76	10.35	10.37	9.81	11.94	10.11	13.61	10.97
	II	11.10	10.37	10.01	10.52	11.83	9.79	9.36	12.28	11.74	9.77	12.43	12.19
3	I	12.60	13.87	14.52	14.05	14.95	14.17	14.19	13.83	13.89	13.74	9.26	13.60
	II	13.09	13.34	14.62	15.60	16.11	5.77	9.62	14.40	14.72	15.34	14.70	14.56
4	I	12.51	13.62	11.40	12.65	13.76	12.65	12.37	12.51	12.93	14.32	13.48	14.32
5	IV	13.35	12.01	11.77	12.24	13.54	11.81	11.65	14.15	13.27	13.60	13.72	13.19
6	II	8.88	8.60	10.73	9.91	8.72	9.04	9.34	10.05	10.76	9.40	10.24	9.02
7	I	13.58	13.74	12.71	12.17	16.25	12.61	12.96	12.50	13.57	10.69	11.78	10.67
8	I	9.10	9.14	8.89	8.99	10.82	9.70	9.66	10.01	9.40	12.26	11.82	11.37
9	II	11.94	12.08	10.97	10.83	11.67	12.22	11.67	11.94	12.08	11.39	13.06	11.80
10	III	21.28	19.80	18.50	19.11	18.54	18.20	20.37	18.62	19.34	18.86	19.78	18.73
11	II	12.50	12.96	13.20	13.91	12.51	12.91	14.93	14.36	12.36	13.68	14.09	14.18
12	III	13.62	12.99	13.59	11.30	12.76	13.40	12.91	13.59	10.09	13.40	12.83	13.18
13	III	18.10	16.74	15.54	19.52	19.22	16.82	18.88	18.31	20.23	16.06	17.65	16.20
14	III	13.58	12.67	11.26	13.08	11.73	13.48	13.02	13.88	11.72	14.69	14.02	14.30
15	I	13.90	11.54	11.59	13.14	14.21	16.08	13.36	12.09	11.09	15.50	15.56	14.27
	III	13.27	13.47	12.42	11.44	12.94	11.33	12.57	13.27	11.85	13.55	14.23	14.19
													Sugar
Station	Grouping	$N_0P_0K_0$	$N_0P_0K_1$	$N_0P_0K_2$	$N_0P_1K_0$	$N_0P_1K_1$	$N_0P_1K_2$	$N_0P_2K_0$	$N_0P_2K_1$	$N_0P_2K_2$	$N_1P_0K_0$	$N_1P_0K_1$	$N_1P_0K_2$
1	I	15.2	14.3	15.5	15.0	14.4	14.7	15.2	14.4	14.6	14.4	14.4	14.2
2	I	18.4	17.3	18.7	18.5	19.1	18.3	18.4	18.7	19.0	18.5	18.8	19.3
	II	18.5	18.4	18.0	18.0	19.6	18.1	17.9	18.5	18.4	18.9	19.1	18.5
3	I	17.8	18.5	18.5	18.6	18.2	18.2	18.6	18.8	17.0	18.6	16.9	18.7
	II	19.5	18.1	18.0	18.0	18.8	17.2	17.8	18.4	18.5	17.8	17.7	18.1
4	I	19.4	19.0	18.2	19.4	19.0	17.3	19.1	19.3	19.1	19.1	19.1	18.8
5	IV	18.7	19.4	18.5	18.8	18.6	18.7	18.1	18.6	18.1	18.6	19.0	18.7
6	II	19.5	20.9	19.7	19.5	20.2	20.5	19.2	20.6	19.1	18.9	19.5	20.2
7	I	16.1	14.3	15.1	14.6	16.1	15.0	14.0	14.9	16.0	15.5	15.1	14.7
8	I	21.5	21.2	21.3	21.2	21.6	21.3	21.1	21.5	21.1	21.2	21.7	21.2
9	II	18.4	18.4	18.6	17.9	18.9	17.5	17.4	18.0	18.1	16.7	18.4	18.9
10	III	17.1	16.7	18.1	19.1	17.5	16.7	17.6	17.9	17.9	16.6	17.0	17.3
11	II	18.9	18.2	18.0	17.8	18.8	18.7	18.2	18.2	18.4	18.0	17.6	18.6
12	III	19.4	19.6	21.0	19.6	21.2	21.0	21.3	21.0	20.0	19.2	19.8	20 4
13	III	14.9	13.9	14.5	15.0	15.1	15.6	13.5	15.0	14.5	14.1	15.0	15.3
14	III	16.3	17.3	17.4	17.0	17.2	16.6	16.6	16.7	17.3	16.6	16.6	17.4
15	I	17.7	18.1	18.3	17.8	17.6	17.9	17.2	18.0	17.7	17.6	17.4	17.8
	III	17.7	18.0	17.9	17.7	18.0	17.6	17.4	17.7	17.6	17.6	17.9	17.0
													Total Sugar :
1	I	39.5	28.8	33.7	34.0	32.1	37.9	33.0	34.6	31.6	26.0	31.5	31.6
2	I	43.3	34.3	40.0	34.4	44.9	37.9	38.2	36.7	45.4	37.4	51.2	42.3
	II	41.1	38.2	36.0	37.9	46.4	35.4	33.5	45.4	43.2	36.9	47.5	45.1
3	I	44.8	51.3	53.7	52.3	54.4	51.6	52.8	52.0	47.2	51.1	31.3	50.9
	II	51.0	51.0	52.6	56.2	60.6	19.8	34.2	53.0	54.5	54.6	52.0	52.7
4	I	48.5	51.8	41.5	49.1	52.3	43.8	47.2	48.3	49.4	54.7	51.5	53.8
5	IV	49.9	46.6	43.5	46.0	50.4	44.2	42.2	52.6	48.0	50.6	52.1	49.3
6	II	34.6	35.9	42.3	38.6	35.2	37.1	35.9	41.4	41.1	35.5	39.9	36.4
7	I	43.7	39.3	38.4	35.5	52.3	37.8	36.3	37.2	43.4	33.1	35.6	31.4
8	I	39.1	38.8	37.9	38.1	46.7	41.3	40.8	43.0	39.7	52.0	51.3	48.2
9	II	43.9	44.4	40.8	38.8	44.1	42.8	40.6	43.0	43.7	38.0	48.1	44.6
10	III	72.8	66.1	67.0	73.0	64.9	60.8	71.7	66.6	69.2	62.6	67.2	64.8
11	II	47.2	47.2	47.5	49.5	47.0	48.3	54.3	52.3	45.5	49.2	49.6	52.7
12	III	52.8	50.9	57.1	44.3	54.1	56.3	53.3	57.1	40.4	51.4	50.8	53.8
13	III	53.9	46.5	45.1	58.6	58.0	52.5	51.0	54.9	58.7	45.3	53.0	49.6
14	III	44.3	43.8	39.2	44.5	40.4	44.8	43 2	46.4	40.6	48.8	46.5	49.8
15	I	49.2	41.8	42.4	46.8	50.0	57.6	46 0	43.5	39.2	54.6	54.1	50.8
	III	47.0	48.5	44.5	40.5	46.6	39.9	43.7	47.0	41 7	47.7	50.9	48.2

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Individual Treatments

$N_1P_1K_0$	$N_2P_1K_1$	$N_1P_1K_2$	$N_1P_2K_0$	$N_1P_2K_1$	$N_1P_2K_2$	$N_2P_0K_0$	$N_2P_0K_1$	$N_2P_0K_2$	$N_2P_1K_0$	$N_2P_1K_1$	$N_2P_1K_2$	$N_2P_2K_0$	$N_2P_2K_1$	$N_2P_2K_2$
Block Grouping														
b a a c	c b b a	a c c b	a c b a	b a c b	c b a c	b c b c	c a c a	a b a b	a b c a	b c a b	c a b c	c a a b	a b b c	b c c a
Tons per Acre														
10.46	8.57	9.81	9 71	10 56	11.98	9.24	9.91	12.16	12.12	11.11	10.40	11.37	12.55	12.10
11.64	11.10	11 23	11 31	12.11	10.91	11.14	10.71	12.43	12.34	11.31	10.39	10.82	12.99	11.79
14.01	10.46	12.60	12.26	11.44	11.85	13.05	14.87	8.78	10.22	12.26	12.77	13.67	12.90	12.62
14.50	12.83	11.13	13.19	14.84	13.54	12.48	14.28	12.72	7.97	14.80	13.78	14.19	13.89	13.07
14.28	10.36	14.03	13.85	14.58	7.50	13.93	14.62	15.78	14.34	13.91	14.74	13.54	12.77	14.58
14.74	14.04	13.62	14.74	13.07	13.62	14.88	13.76	15.56	14.18	16.27	14.32	14.32	15.57	14.32
13.14	12.65	12.82	13.48	13.95	12.39	13.72	12.10	12.48	10.54	14.11	12.68	11.83	13.76	14.35
10.05	10.12	10.54	11.04	11.60	9.61	11.24	9.23	9.77	10.51	11.50	10.63	11.24	10.49	10.87
5.95	11.32	14.62	15.92	12.71	12.86	11.89	12.14	11.96	14.78	13.31	9.94	10.62	16.27	8.97
11.34	10.75	12.45	9.76	11.70	11.63	12.32	12.92	12.92	12.77	12.64	12.64	13.32	13.63	12.64
11.11	12.36	12.50	13.06	12.92	12.50	13.47	12.64	12.64	13.75	12.50	14.17	12.50	14.58	13.89
18.61	20.09	18.75	20.70	19.68	20.11	20.11	19.50	19.27	21.14	19.78	20.61	17.75	21.11	19.23
14.93	13.64	14.71	15.39	13.68	14.80	14.81	14.63	15.09	14.69	14.40	13.89	14.54	14.68	15.26
11.30	13.88	13.59	14.96	13.30	12.60	8.82	14.48	13.18	14.03	12.00	13.50	13.15	11.08	13.62
18.66	19.32	19.94	16.79	18.50	17.20	20.66	18.40	15.88	18.62	18.32	15.79	19.36	18.10	17.00
14.30	13.58	15.16	15.31	14.03	14.97	15.36	15.89	17.67	15.84	14.29	15.26	15.23	14.52	14.91
12.55	15.26	15.02	14.82	16.17	15.54	13.82	15.19	17.24	17.13	16.56	17.28	17.50	16.80	14.67
13.44	16.78	16.15	13.34	13.92	16.63	16.61	17.92	14.47	14.93	14.08	16.56	14.75	17.68	16.08
Percentage														
$N_1P_1K_0$	$N_1P_1K_1$	$N_1P_1K_2$	$N_1P_2K_0$	$N_1P_2K_1$	$N_1P_2K_2$	$N_2P_0K_0$	$N_2P_0K_1$	$N_2P_0K_2$	$N_2P_1K_0$	$N_2P_1K_1$	$N_2P_1K_2$	$N_2P_2K_0$	$N_2P_2K_1$	$N_2P_2K_2$
14.6	14.7	14.2	14.5	14.5	14.8	14.4	15.0	14.9	14.0	14.3	14.7	14.2	14.7	14.6
18.5	18.2	18.8	18.2	18.4	18.9	18.5	18.5	18.4	18.3	18.8	18.2	17.9	18.0	18.0
18.8	18.2	18.1	16.1	18.0	18.4	18.0	18.7	18.7	17.7	17.8	18.7	18.4	19.1	18.5
17.5	17.6	16.5	17.7	17.6	17.0	17.0	18.3	17.6	16.4	17.8	18.4	17.6	17.7	18.5
18.6	16.9	18.5	17.2	19.0	16.1	16.8	17.8	17.3	17.6	18.2	18.1	17.8	17.1	17.2
19.2	19.3	19.0	19.2	18.9	18.7	18.8	18.3	17.9	18.4	18.5	17.9	17.5	18.5	18.9
18.5	18.6	18.3	18.8	18.6	19.0	18.0	18.1	18.2	17.5	19.0	18.5	18.0	18.6	18.4
19.6	19.7	19.6	19.4	18.9	19.8	18.8	19.8	19.6	18.3	18.7	19.5	18.2	19.4	19.2
14.1	14.2	15.1	14.0	14.2	15.6	14.9	15.2	16.0	15.1	13.9	14.9	14.1	15.1	15.0
21.6	21.3	21.5	21.4	21.1	21.7	21.5	21.7	21.6	21.6	21.3	21.4	21.4	21.7	21.5
19.0	18.4	18.0	18.5	19.0	16.7	18.7	18.5	16.9	17.3	18.8	17.7	17.7	16.9	18.7
17.8	17.9	16.6	17.6	19.1	17.6	18.0	17.6	17.4	17.1	17.7	16.5	16.8	16.6	18.7
18.2	18.2	17.7	17.0	18.2	17.6	17.2	18.2	18.1	17.7	17.3	18.0	17.7	18.4	18.0
19.3	20.1	20.6	20.3	20.2	21.2	17.8	18.6	19.3	18.3	19.6	19.1	19.1	18.0	20.0
14.5	15.2	14.1	14.4	14.2	15.3	14.4	14.2	15.5	15.0	15.0	15.2	14.1	14.9	14.0
16.6	16.6	17·3	16.9	17.0	16.4	16.5	16.4	15.9	16.4	16.4	16.8	16.1	16.0	16.6
16.8	18.1	17.2	17.7	18.0	18.4	16.6	17.8	17.8	17.5	18.0	18.4	17.4	17.7	17.1
17.1	17.4	18.0	17.1	18.0	18.3	17.5	17.6	17.3	17.7	17.2	17.8	16.7	17.3	18.2
Cwt. per Acre														
30.5	25.2	27.9	28.2	30.6	35.5	26.6	29.7	36.2	33.9	31.8	30.6	32.3	36.9	35.3
43.1	40.4	42.2	41.2	44.6	41.2	41.2	39.6	45.7	45.2	42.5	37.8	38.7	46.8	42.4
52.7	38.1	45.6	39.5	41.2	43.6	47.0	55.6	32.8	36.2	43.6	47.8	50.3	49.3	46.7
50.8	45.2	36.7	46.7	52.2	46.0	42.4	52.3	44.8	26.1	52.7	50.7	49.9	49.2	48.4
53.1	35.0	51.9	47.6	55.4	24.2	46.8	52.0	54.6	50.5	50.6	53.4	48.2	43.7	50.2
56.6	54.2	51.8	56.6	49.4	50.9	55.9	50.4	55.7	52.2	60.2	51.3	50.1	57.6	54.1
48.6	47.0	46.9	50.7	51.9	47.1	49.4	43.8	45.4	36.9	53.6	46.9	42.6	51.2	52.8
39.4	39.9	41.3	42.8	43.8	38.0	42.3	36.6	38.3	38.5	43.0	41.4	40.9	40.7	41.7
16.8	32.1	44.2	44.6	36.1	40.1	35.4	36.9	38.3	44.6	37.0	29.6	29.9	49.1	26.9
49.0	45.8	53.5	41.8	49.4	50.5	53.0	56.1	55.8	55.2	53.8	54.1	57.0	59.2	54.4
42.2	45.5	45.0	48.3	49.1	41.8	50.4	46.8	42.7	47.6	47.0	50.2	44.2	49.3	51.9
66.2	71.9	62.2	72.9	75.2	70.8	72.4	68.6	67.0	72.3	70.0	68.0	59.6	70.1	71.9
54.3	49.6	52.1	52.3	49.8	52.1	50.9	53.2	54.6	52.0	49.8	50.0	51.5	54.0	54.9
43.6	55.8	56.0	60.7	53.7	53.4	31.4	53.9	50.9	51.3	47.0	51.6	50.2	39.9	54.5
54.1	58.7	56.2	48.4	52.5	52.6	59.5	52.2	49.2	55.9	55.0	48.0	54.6	53.9	47.6
47.5	45.1	52.4	51.7	47.7	49.1	50.7	52.1	56.2	52.0	46.9	51.3	49.0	46.5	49.5
42.2	55.2	51.7	52.5	58.2	57.2	45.9	54.1	61.4	60.0	59.6	63.6	60.9	59.5	50.2
46.0	58.4	58.1	45.6	50.1	60.9	58.1	63.1	50.1	52.8	48.4	59.0	49.3	61.2	58.5

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Plant number :

Station	Grouping	$N_0P_0K_0$	$N_0P_0K_1$	$N_0P_0K_2$	$N_0P_1K_0$	$N_0P_1K_1$	$N_0P_1K_2$	$N_0P_2K_0$	$N_0P_2K_1$	$N_0P_2K_2$	$N_1P_0K_0$	$N_1P_0K_1$	$N_1P_0K_2$
1	I	21.3	17.0	19.7	19.7	20.5	18.9	21.3	18.6	20.5	18.0	21.7	23.0
2	I	24.8	28.2	22.5	25.5	25.3	22.9	22.5	25.3	25.3	22.1	28.6	24.2
	II	28.4	27.1	25.9	30.0	28.4	26.9	25.4	28.1	28.4	27.2	26.4	26.2
3	I	30.7	31.7	31.7	31.6	30.8	32.1	31.7	31.9	27.8	31.6	18.9	31.5
	II	30.6	30.8	31.2	33.1	33.5	14.1	22.5	30.5	31.7	31.8	31.7	29.9
4	I	28.4	27.9	29.6	25.0	30.6	31.9	30.2	27.3	30.2	24.1	29.4	26.8
5	IV	27.6	29.3	28.3	29.6	28.6	26.3	27.3	28.1	28.9	28.6	28.4	29.6
6	II	20.0	22.6	23.1	24.3	18.8	22.7	22.8	21.9	22.7	22.7	23.5	23.8
7	I	23.9	22.9	25.0	23.7	21.7	22.0	22.9	22.9	25.4	24.4	21.4	23.7
8	I	24.3	26.3	23.6	25.2	26.8	26.0	24.5	26.3	24.7	24.2	25.7	25.5
9	II	23.3	23.5	25.9	20.6	22.5	26.2	23.5	22.1	24.1	18.6	23.5	27.2
10	III	35.0	40.3	38·2	40.2	38.4	37.9	39.2	36.7	38.2	38.9	39.7	39.4
11	II	31.5	30.4	25.0	28.1	30.8	31.8	29.8	30.3	31.3	31.1	31.7	30.0
13	III	29.3	32.2	30.0	27.9	28.9	28.8	29.5	29.1	26.2	29.8	30.4	28.3
14	III	34.9	29.9	31.9	37.4	32.8	30.4	33.3	29.7	36.4	30.5	31.7	31.3
15	I	22.9	23.5	23.8	25.4	26.6	25.2	25.0	23.8	22.2	24.4	23.5	26.0
	III	21.1	22.8	23.1	21.3	22.6	22.7	22.4	24.9	21.4	19.8	23.5	24.9

Tops : Tons

1	I	11.31	10.70	9.58	12.86	8.37	8.80	10.79	10.62	10.18	11.39	8.11	14.76
2	I	5.31	4.95	5.16	4.48	6.28	5.23	5.70	5.34	6.19	6.13	7.26	6.62
	II	5.08	5.12	5.34	5.21	6.08	5.46	4.88	6.17	6.11	5.81	6.32	7.37
3	I	10.54	8.87	11.62	11.03	10.85	10.30	10.24	8.12	11.16	10.50	8.58	9.75
	II	8.38	9.05	10.95	10.95	12.03	5.16	8.81	8.97	12.32	15.21	11.83	12.03
4	I	7.09	5.62	5.36	4.95	6.44	6.09	4.95	5.47	5.88	8.17	8.10	7.08
5	IV	7.24	6.08	6.66	6.71	10.75	9.64	7.29	8.72	7.18	8.98	7.13	8.00
6	II	5.78	4.61	7.62	5.70	6.61	6.75	6.09	7.21	9.00	7.14	8.12	7.07
7	I	18.60	21.01	19.28	21.18	21.77	20.71	22.96	21.31	23.78	18.92	17.08	19.89
10	III	16.14	19·86	16.36	15.50	16.64	14.93	18.28	15.50	17.50	19.21	18.00	18.36
11	II	5.67	5.25	4.79	5.04	7.38	5.00	7.29	8.08	4.46	7.79	8.96	5.00
12	III	7.82	8.32	6.70	6.36	6.50	6.16	5.57	5.83	5.40	7.09	7.36	8.29
14	III	11.48	8.92	6.93	8.66	7.85	11.39	10.47	8.21	6.60	11.10	12.88	10.53

Percentage

1	I	88.7	90.2	89.8	90.5	89.0	90.2	89.0	87.8	90.8	88.5	87.9	89.1
2	I	89.8	89.6	89.8	88.2	89.9	90.0	89.5	89.5	89.2	86.0	88.3	88.7
	II	87.8	89.5	90.2	89.9	91.1	87.7	87.7	90.1	89.4	88.4	89.1	89.0
3	I	90.5	91.3	92.4	92.0	91.1	90.9	91.0	90.8	90.1	91.7	89.0	90.0
	II	92.2	92.0	90.5	91.9	91.1	88.9	89.8	92.6	91.1	90.0	91.2	90.2
4	I	90.3	90.5	90.0	90.9	90.3	91.4	90.1	90.3	90.0	90.2	89.1	89.7
5	IV	90.4	93.8	90.5	95.1	94.3	92.0	93.5	92.7	89.7	91.5	92.0	95.5
6	II	88.9	88.8	87.6	88.0	89.8	88.3	89.8	90.0	89.1	88.6	88.8	89.4
7	I	86.2	86.0	86.3	85.2	86.6	86.1	85.8	86.3	86.8	86.1	87.0	86.1
8	I	87.3	87.3	87.3	87.3	87.2	87.5	87.2	87.4	87.2	87.4	87.3	87.4
9	II	95.0	92.0	96.4	89.9	93.1	89.7	89.8	90.6	95.2	86.8	92.4	93.4
10	III	86.0	84.8	87.0	87.5	87.1	84.3	86.7	85.6	86.0	85.5	84.0	85.4
13	III	83.0	80.7	82.4	83.3	81.7	79.2	77.7	82.2	82.7	80.9	81.8	85.8
14	III	88.1	89.1	89.3	89.3	89.7	89.0	89.2	89.5	89.6	89.1	88.0	88.6
15	I	90.5	90.7	89.3	89.8	91.0	90.1	91.2	90.6	92.3	91.2	90.6	90.0
	III	92.0	90.9	90.7	90.4	91.7	90.0	90.5	90.5	90.8	90.7	90.1	91.3

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Thousands per Acre

$N_1P_1K_0$	$N_1P_1K_1$	$N_1P_1K_2$	$N_1P_2K_0$	$N_1P_2K_1$	$N_1P_2K_2$	$N_2P_0K_0$	$N_2P_0K_1$	$N_2P_0K_2$	$N_2P_1K_0$	$N_2P_1K_1$	$N_2P_1K_2$	$N_2P_2K_0$	$N_2P_2K_1$	$N_2P_2K_2$
19.1	19.1	20.3	18.6	21.3	19.5	19.7	20.7	17.8	17.2	20.9	19.1	18.9	19.7	23.4
26.7	27.1	26.8	25.7	26.6	27.7	27.6	25.7	25.0	28.1	26.5	25.6	23.3	23.0	25.4
27.3	28.6	28.2	27.8	27.3	29.0	29.2	30.0	22.2	26.7	26.8	30.0	28.3	29.5	29.0
32.3	32.4	21.9	26.9	30.8	31.0	31.8	33.2	27.1	15.4	29.5	31.0	30.8	27.9	29.7
31.1	23.3	30.9	30.0	32.5	18.0	31.0	32.0	27.0	30.1	30.1	31.1	31.9	24.2	31.9
26 7	27.8	28.9	27.2	30.4	28.3	27.8	29.9	29.9	27.2	28.9	29.2	26.8	29.9	25.9
28.0	28.5	28.2	27.8	28.9	27.7	29.6	25.6	29.1	27.5	29.2	27.6	28.9	28.0	26.3
22.5	21.8	23.3	23.2	21.6	21.4	23.5	23.7	21.8	19.7	23.4	25.1	21.0	22.8	22.6
22.8	26.4	23.3	25.1	22.2	22.6	23.9	25.2	22.4	24.3	20.2	24.0	23.9	25.4	22.8
26.4	25.5	26.5	24.9	23.9	26.5	26.1	25.0	25.4	25.1	26.5	26.4	27.3	25.9	26.3
23.8	18.3	26.5	27.7	21.4	20.4	21.0	25.1	27.9	24.6	20.2	28.5	27.9	24.8	22.8
39.2	40.0	38.1	44.5	38.9	40.8	42.7	39.5	40.0	41.4	39.8	41.0	39.8	43.5	37.8
30.6	29.8	28.5	29.0	33.0	29.7	24.3	30.6	28.4	30.4	27.4	30.8	31.9	31.5	29.3
29.3	28.1	31.1	28.7	29.6	28.7	31.4	29.0	27.5	29.0	29.7	27.0	29.4	28.4	30.1
36.6	33.7	35.2	31.1	36.0	29.1	33.7	30.5	38.8	29.1	39.0	34.5	38.5	31.9	34.4
23.1	24.5	25.1	23.0	23.7	27.0	23.5	26.4	24.0	24.4	25.8	26.1	27.2	24.5	24.4
22.7	22.3	25.6	23.1	26.2	27.5	23.5	26.0	23.0	22.0	21.1	23.7	23.7	25.4	23.1

per Acre

9.49	10.88	7.94	11.91	9.84	9.67	13.12	12.51	11.91	11.82	13.72	18.38	12.43	11.91	13.81
6.38	5.78	7.54	6.77	7.07	6.41	7.18	7.01	8.81	8.70	7.91	6.90	7.16	8.98	8.21
7.74	6.28	7.86	6.24	7.20	6.96	8.10	9.90	7.50	7.50	9.49	9.66	9.68	9.30	9.60
10.69	11.91	11.26	13.32	12.13	14.97	10.22	14.17	12.77	8.54	10.89	13.19	14.30	12.58	10.24
10.28	9.67	11.72	12.30	10.16	8.18	14.93	15.15	14.58	13.05	9.30	14.32	12.95	12.38	12.20
7.97	7.86	8.77	8.47	7.04	6.57	10.07	9.83	11.10	10.43	9.05	8.79	9.96	11.12	9.70
9.48	8.88	7.13	8.27	8.88	7.92	9.35	7.74	7.13	6.76	7.16	7.71	9.19	8.93	10.35
7.62	8.43	8.66	8.45	11.11	8.00	10.50	8.20	8.36	10.09	12.87	7.89	10.61	8.05	11.16
19.33	21.52	22.03	22.33	20.29	23.00	19.44	18.64	19.37	25.38	20.40	20.19	23.66	21.19	21.60
15.78	19.14	17.93	17.78	16.71	14.64	18.36	18.00	16.00	20.14	17.00	19.00	16.07	20.28	18.64
8.21	8.21	6.67	9.04	5.46	8.00	7.08	7.33	12.00	5.88	12.17	7.58	8.75	10.83	12.00
8.82	9.41	6.46	7.76	6.40	7.03	6.53	9.64	9.55	10.04	8.55	8.72	8.78	8.88	7.16
11.54	13.98	10.26	11.84	13.03	11.21	16.00	15.23	20.44	15.35	16.00	14.78	14.16	17.25	14.87

Purity

87.6	89.7	88.4	90.5	89.7	89.0	88.6	90.0	89.7	89.9	88.3	88.1	89.0	89.2	88.7
89.5	90.7	88.3	89.1	87.3	89.2	88.5	88.3	89.9	87.3	88.6	86.9	86.3	87.0	87.3
88.8	88.2	89.3	89.6	88.8	86.8	88.8	89.5	89.2	89.2	88.9	88.0	88.8	89.0	90.6
89.6	91.0	89.0	88.7	89.8	91.0	88.6	91.4	88.8	88.1	89.8	90.8	90.1	90.4	91.1
90.6	88.2	90.8	91.4	92.2	88.6	90.0	90.8	89.1	90.3	92.2	89.6	91.1	90.0	90.2
91.1	89.8	89.8	88.9	88.1	88.9	88.4	89.5	88.4	89.1	90.8	85.9	90.5	90.7	89.5
91.4	94.0	90.6	93.7	89.9	90.7	91.0	89.5	91.3	92.3	90.4	90.1	89.7	93.8	90.7
87.9	87.9	89.4	89.1	90.5	87.2	89.0	86.2	89.3	89.3	90.4	89.8	90.0	89.2	89.2
85.2	84.8	86.3	85.3	86.0	85.9	85.9	85.3	86.7	86.5	85.5	85.7	86.2	86.0	86.7
87.4	87.2	87.2	87.5	87.1	87.4	87.3	87.2	87.3	87.4	87.1	87.5	87.2	87.3	87.3
95.8	82.3	88.6	94.2	94.8	89.8	85.0	95.3	87.2	88.9	83.0	94.8	92.7	88.5	86.6
86.4	87.3	85.9	85.4	87.0	86.2	86.2	86.8	84.5	87.7	86.5	83.2	84.3	84.4	88.5
81.8	82.3	78.6	77.9	79.9	82.3	81.2	80.5	82.0	83.3	82.6	81.5	77.7	82.9	79.3
89.0	88.6	89.6	88.6	88.8	89.3	88.4	88.2	89.2	88.7	87.8	89.2	88.6	88.0	87.9
89.9	90.1	90.5	91.3	91.4	89.3	89.7	90.0	89.0	88.3	89.8	90.1	89.5	91.7	90.7
90.4	89.1	90.7	89.6	91.3	91.0	90.0	90.2	90.5	88.7	90.9	89.0	89.5	89.5	89.9

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Responses to Fertilisers

The linear response is measured by the response to the double dressing. A positive deviation means that the additional response to the double dressing was larger than the response to the single, their difference being shown in the tables.

* 5 per cent significance. ** 1 per cent significance.

	Station	*Mean yield*	Linear response to N	P	K	St. error	Deviation from linear response to N	P	K	St. error
			Roots (washed) : tons per acre							
1	Allscott ..	*10.97*	−0.24	+0.63	+0.57	±0.519	+2.18*	+0.29	+0.61	±0.899
2	Bardney ..	*11.44*	+1.23**	+0.35	+0.01	±0.285	−0.67	+0.35	−1.03*	±0.494
3	Brigg ..	*13.42*	+0.11	−0.38	−0.21	±0.603	+0.95	+0.70	−0.97	±1.04
4	Bury ..	*13.83*	+2.08**	−0.05	−0.22	±0.351	−0.48	−0.57	−0.52	±0.608
5	Cantley ..	*12.90*	+0.20	+0.32	+0.14	±0.453	−0.94	+0.86	−1.30	±0.785
6	Colwick ..	*10.12*	+1.05**	+0.87**	−0.07	±0.287	−0.19	+0.01	+0.17	±0.497
7	Ely ..	*12.46*	−1.14	+0.80	−0.08	±0.886	+1.88	+0.40	−2.62	±1.53
8	Felstead ..	*11.28*	+3.34**	+0.11	+0.23	±0.356	−0.52	−0.19	−0.63	±0.617
9	Ipswich ..	*12.45*	+1.64**	+0.57	+0.34	±0.344	+0.46	+0.33	−0.56	±0.596
10	King's Lynn	*19.54*	+0.52	+0.12	−0.57	±0.481	+0.18	+0.34	−0.35	±0.833
11	Newark ..	*14.10*	+1.37**	+0.54*	−0.33	±0.198	−0.73*	+0.44	+0.65	±0.343
12	Oaklands ..	*12.84*	0.00	−0.14	+0.40	±0.622	−1.16	−0.06	−0.44	±1.08
13	Peterborough	*17.99*	−0.14	+1.02	−1.34*	±0.618	+0.54	−1.42	−0.88	±1.07
14	Poppleton ..	*14.21*	+2.72**	−0.21	−0.18	±0.357	−0.82	+0.39	+1.10	±0.618
15	Wissington	*14.55*	+3.32**	+0.19	+0.38	±0.443	−0.84	−0.49	−0.96	±0.767
	Mean ..	*13.47*	*+1.07*	*+0.32*	*−0.06*		*−0.01*	*+0.09*	*−0.52*	

	Station	Mean yield	Linear response to N	Linear response to P	Linear response to K	St. error	Deviation from linear response to N	Deviation from linear response to P	Deviation from linear response to K	St. error
					Sugar percentage					
1	Allscott ..	*14.6*	−0.27	−0.09	+0.08	±0.160	+0.39	+0.29	+0.26	±0.277
2	Bardney ..	*18.4*	−0.09	−0.24	+0.31	±0.159	−0.07	−0.08	−0.33	±0.275
3	Brigg ..	*17.8*	−0.68**	−0.24	−0.09	±0.174	+0.60	+0.08	−0.47	±0.301
4	Bury ..	*18.7*	−0.57**	+0.07	−0.48*	±0.175	−0.90*	+0.20	−0.43	±0.303
5	Cantley ..	*18.5*	−0.36*	−0.11	+0.16	±0.152	−0.49	−0.04	−0.62*	±0.263
6	Colwick ..	*19.5*	−0.86**	−0.34	+0.64*	±0.241	−0.06	−0.06	−0.76	±0.417
7	Ely ..	*14.9*	−0.21	−0.44*	+0.56**	±0.171	+0.59	+0.42	+0.42	±0.296
8	Felstead ..	*21.4*	+0.20*	−0.04	−0.13	±0.093	+0.02	−0.02	+0.01	±0.161
9	Ipswich ..	*18.1*	−0.22	−0.28	−0.06	±0.262	−0.31	−0.28	−0.88	±0.454
10	King's Lynn	*17.5*	−0.24	+0.44	−0.10	±0.402	0.00	+0.20	−0.16	±0.696
11	Newark ..	*18.0*	−0.51**	−0.12	+0.27	±0.140	+0.40	−0.03	−0.27	±0.242
12	Oaklands ..	*19.8*	−1.59**	+0.67**	+0.92**	±0.197	−0.93*	−0.15	+0.08	±0.341
13	Peterborough	*14.7*	+0.03	−0.21	+0.46	±0.226	+0.01	−0.86*	−0.12	±0.391
14	Poppleton ..	*16.7*	−0.59**	−0.08	+0.30*	±0.128	−0.37	−0.20	+0.04	±0.222
15	Wissington	*17.6*	−0.24	−0.01	+0.42**	±0.107	+0.04	−0.03	−0.36	±0.185
	Mean ..	*17.7*	*−0.41*	*−0.07*	*+0.22*		*−0.07*	*−0.04*	*−0.24*	

	Station	*Mean yield*	Linear response to N	Linear response to P	Linear response to K	St. error	Deviation N	Deviation P	Deviation K	St. error
	Total sugar : cwt. per acre									
1	Allscott ..	*32.0*	−1.3	+1.6	+1.8		+7.1	+1.6	+2.4	
2	Bardney ..	*42.1*	+4.2	+0.7	+0.7		−2.6	+1.1	−4.7	
3	Brigg ..	*48.1*	−1.5	−1.9	−0.9		+4.7	+2.3	−4.7	
4	Bury ..	*51.8*	+6.2	0.0	−2.1		−4.4	−1.8	−3.1	
5	Cantley ..	*47.8*	−0.1	+1.0	+0.8		−4.7	+3.2	−6.4	
6	Colwick ..	*39.4*	+2.4	+2.7	+1.0		−1.0	−0.1	−0.8	
7	Ely ..	*37.2*	−4.0	+1.3	+1.2		+7.0	+1.7	−6.8	
8	Felstead ..	*48.3*	+14.8	+0.4	+1.0		−2.2	−0.8	−3.0	
9	Ipswich ..	*45.0*	+5.4	+1.4	+1.1		+0.8	+0.6	−4.1	
10	King's Lynn	*68.4*	+0.9	+2.2	−2.4		+0.5	+2.0	−1.8	
11	Newark ..	*50.8*	+3.5	+1.7	−0.4		−1.5	+1.5	+1.6	
12	Oaklands ..	*51.0*	−4.0	+1.2	+3.9		−6.8	−0.4	−1.5	
13	Peterborough	*52.8*	−0.4	+2.2	−2.4		+1.6	−7.2	−3.2	
14	Poppleton ..	*47.4*	+7.4	−0.8	+0.1		−4.0	+0.6	+3.7	
15	Wissington	*51.4*	+11.1	+0.7	+2.6		−2.9	−1.9	−4.2	
	Mean ..	*47.6*	*+3.0*	*+1.0*	*+0.4*		*−0.6*	*+0.2*	*−2.4*	
	Plant number : thousands per acre									
1	Allscott ..	*19.8*	0.0	+0.4	+0.9	±0.816	−0.6	+1.2	−0.3	±1.41
2	Bardney ..	*26.6*	+0.6	+0.4	−0.3	±0.517	−0.8	−1.4	−1.7	±0.895
3	Brigg ..	*29.3*	−0.7	−1.3	−1.3	±1.23	+1.7	+2.1	−1.5	±2.13
4	Bury ..	*28.4*	−0.7	+0.2	+1.9*	±0.761	+1.9	−0.2	−2.3	±1.32
5	Cantley ..	*28.2*	−0.3	−0.5	−0.4	±0.477	−0.7	+0.1	−0.2	±0.826
6	Colwick ..	*22.5*	+0.5	−0.5	+0.7	±0.714	−0.5	+0.1	+0.7	±1.24
7	Ely ..	*23.5*	+0.2	0.0	−0.4	±0.716	−0.2	+1.0	+1.0	±1.24
8	Felstead ..	*25.6*	+0.7	+0.4	+0.3	±0.494	+0.5	−1.4	−0.5	±0.856
9	Ipswich ..	*23.8*	+1.2	−0.2	+2.0*	±0.939	+2.2	+1.0	+4.2*	±1.63
10	King's Lynn	*39.6*	+2.4**	+0.6	−1.1	±0.653	−1.0	+0.2	−0.1	±1.13
11	Newark ..	*29.9*	−0.5	+1.5	−0.2	±0.694	−1.5	+0.3	−2.2	±1.20
13	Peterborough	*29.2*	−0.1	−0.9	−0.7	±0.507	−0.5	+0.9	−1.1	±0.878
14	Poppleton ..	*33.4*	+1.5	+0.8	−0.4	±1.60	+1.9	−2.6	+1.8	±2.77
15	Wissington	*24.0*	+1.0	+0.8	+1.1*	±0.462	−0.8	+0.2	−0.9	±0.800
	Mean ..	*27.4*	*+0.4*	*+0.1*	*+0.2*		*+0.1*	*+0.1*	*−0.2*	

	Station	*Mean yield*	Linear response to N	P	K	St. error	Deviation from linear response to N	P	K	St. error
	Tops : tons per acre									
1	Allscott ..	*11.36*	+2.94**	−0.25	−0.01	±0.882	+2.76	+0.01	+1.87	±1.53
2	Bardney ..	*6.88*	+2.98**	+0.50*	+0.50*	±0.173	+0.36	−0.12	−0.44	±0.300
3	Brigg ..	*11.28*	+2.58**	−0.21	+0.03	±0.650	−0.22	+1.35	+1.09	±1.13
4	Bury ..	*7.85*	+4.24**	−0.36	−0.30	±0.260	+0.20	+0.10	+0.04	±0.450
5	Cantley ..	*8.12*	+0.45	+0.94	−0.17	±0.651	−0.53	−0.38	−0.39	±1.13
6	Colwick ..	*8.21*	+3.11**	+1.36*	+0.28	±0.580	−0.19	−0.24	−0.44	±1.00
7	Ely ..	*20.92*	−0.08	+3.10**	−0.22	±0.679	+1.30	−1.40	+1.68	±1.18
10	King's Lynn	*17.47*	+1.42*	−0.54	−0.43	±0.589	−0.10	+0.40	−1.29	±1.02
11	Newark ..	*7.55*	+3.41**	+1.11	+0.08	±0.773	+0.21	+0.61	−1.90	±1.34
12	Oaklands ..	*7.63*	+2.14**	−1.04*	−0.46	±0.412	−0.28	−0.78	−0.74	±0.714
14	Poppleton ..	*12.25*	+7.06**	−0.65	−0.41	±0.834	+1.32	+0.17	−1.01	±1.44
	Mean ..	*10.87*	*+2.75*	*+0.36*	*−0.10*		*+0.44*	*−0.03*	*−0.14*	
	Percentage purity									
1	Allscott ..	*89.2*	−0.5	+0.3	+0.1	±0.500	+0.7	+0.1	+0.3	±0.866
2	Bardney ..	*88.8*	−1.0*	−0.3	+0.4	±0.367	+0.6	−0.3	−0.8	±0.636
3	Brigg ..	*90.4*	−1.0**	0.0	−0.3	±0.282	+1.0*	+0.4	−1.1*	±0.488
4	Bury ..	*89.7*	−1.2*	+0.1	−0.6	±0.543	+0.6	−0.5	−0.6	±0.940
5	Cantley ..	*91.8*	−1.5	−0.1	−0.8	±0.861	−0.9	−1.1	−1.2	±1.49
6	Colwick ..	*88.9*	+0.2	+0.9	−0.2	±0.555	+0.6	−0.1	−0.4	±0.961
7	Ely ..	*86.0*	−0.1	−0.1	+0.4	±0.224	+0.5	+0.7	+0.2	±0.388
8	Felstead ..	*87.3*	0.0	0.0	0.0	±0.062	0.0	0.0	+0.2	±0.107
9	Ipswich ..	*90.8*	−3.3*	−0.1	+0.4	±1.37	−0.3	+3.7	+1.8	±2.37
10	King's Lynn	*85.9*	−0.3	+0.4	−0.5	±0.596	+0.1	−0.8	−0.1	±1.03
13	Peterborough	*81.3*	−0.2	−1.7	+0.8	±1.02	+0.2	−0.9	−1.0	±1.77
14	Poppleton ..	*88.8*	−0.8**	+0.1	+0.3	±0.214	0.0	−0.5	+0.5	±0.371
15	Wissington	*90.4*	−0.8**	+0.2	+0.1	±0.227	−0.4	+1.0*	−0.7	±0.393
	Mean ..	*88.4*	*−0.8*	*0.0*	*0.0*		*+0.2*	*+0.1*	*−0.2*	

Interactions

	Station	Interactions † N×P	Interactions † N×K	Interactions † P×K	St. error	Interactions † N×P	Interactions † N×K	Interactions † P×K	St. error
		Roots (washed) : tons per acre				Sugar percentage			
1	Allscott ..	+1.65	+0.85	+0.03	±1.27	0.00	+0.73	−0.17	±0.392
2	Bardney ..	+0.36	−0.76	+0.82	±0.698	−0.42	+0.15	+0.58	±0.389
3	Brigg ..	+0.07	+1.61	−0.98	±1.48	+0.57	+1.13*	−0.52	±0.426
4	Bury ..	−0.09	+0.46	−0.05	±0.860	−0.33	+1.10*	+1.10*	±0.428
5	Cantley ..	−0.10	+1.27	+2.09	±1.11	+0.83*	+0.63	+0.17	±0.372
6	Colwick ..	+0.14	−1.37	−0.13	±0.703	−0.07	+0.63	−0.33	±0.590
7	Ely ..	+0.29	−2.20	−1.09	±2.17	−0.43	+0.13	+1.73**	±0.419
8	Felstead ..	−0.17	−0.15	+0.48	±0.872	+0.03	+0.03	+0.17	±0.228
9	Ipswich ..	+0.51	+0.05	+0.88	±0.842	+0.37	−0.30	−0.23	±0.642
10	King's Lynn	+0.15	+1.61	+1.20	±1.18	−0.80	+0.60	+0.37	±0.984
11	Newark ..	−1.02	+1.02	−1.30*	±0.485	+0.30	+0.43	+0.17	±0.343
12	Oaklands ..	+1.80	+1.55	−2.81	±1.52	−0.30	+0.50	−1.27*	±0.482
13	Peterborough	−2.51	−2.02	+2.20	±1.51	−0.27	0.00	−0.03	±0.553
14	Poppleton ..	−1.80	+1.55	−0.51	±0.874	+0.10	−0.37	−0.20	±0.313
15	Wissington	+0.70	+0.81	+0.33	±1.08	+0.32	+0.28	+0.40	±0.262
	Mean ..	*0.00*	*+0.29*	*+0.08*		*−0.01*	*+0.38*	*+0.13*	
		Total sugar : cwt. per acre				Plant number : thousands per acre			
1	Allscott ..	+4.9	+4.2	−0.2		+0.5	+2.5	+1.0	±2.00
2	Bardney ..	+0.4	−2.5	+4.4		+0.1	−0.2	+4.2**	±1.27
3	Brigg ..	+1.2	+8.4	−4.6		+0.8	+3.1	+0.9	±3.02
4	Bury ..	−1.1	+4.3	+2.9		−2.3	−1.6	−1.9	±1.86
5	Cantley ..	+1.7	+6.2	+8.0		0.0	−0.7	−0.8	±1.17
6	Colwick ..	+0.2	−3.9	−1.2		−1.4	+1.3	−1.0	±1.75
7	Ely ..	−0.1	−6.4	+1.2		+0.4	−1.6	0.0	±1.75
8	Felstead ..	−0.7	−0.6	+2.4		+0.6	−0.2	+0.3	±1.21
9	Ipswich ..	+2.4	−0.5	+2.8		+1.5	−1.0	−10.0**	±2.30
10	King's Lynn	−2.7	+7.7	+5.5		−0.5	−1.7	−2.6	±1.60
11	Newark ..	−2.8	+4.9	−4.4		+1.6	+1.0	+1.0	±1.70
12	Oaklands ..	+6.1	+6.9	−14.0		—	—	—	—
13	Peterborough	−8.0	−6.0	+6.6		+2.2	−1.2	+0.7	±1.24
14	Poppleton ..	−5.7	+4.3	−2.1		−0.4	+4.5	−2.0	±3.92
15	Wissington	+3.2	+4.0	+2.4		−0.1	0.0	−1.4	±1.13
	Mean ..	*−0.1*	*+2.1*	*+0.6*		*+0.2*	*+0.3*	*−0.8*	
		Tops : tons per acre				Percentage purity			
1	Allscott ..	+0.20	+4.38	−0.64	±2.16	−0.1	−1.2	−0.9	±1.22
2	Bardney ..	+0.17	−0.08	−0.02	±0.424	−0.7	−0.1	−1.0	±0.899
3	Brigg ..	−1.23	+0.29	−0.80	±1.59	+1.3	+0.8	+0.3	±0.691
4	Bury ..	+0.51	−0.40	+0.18	±0.637	+1.6	−1.4	−0.1	±1.33
5	Cantley ..	+0.35	−0.78	+1.49	±1.59	+0.4	+2.0	−3.4	±2.11
6	Colwick ..	−0.51	−3.20*	+1.13	±1.42	+0.1	+0.6	−1.0	±1.36
7	Ely ..	−0.05	−2.78	−0.72	±1.66	+0.2	−0.5	+0.4	±0.548
8	Felstead ..	—	—	—	—	+0.1	0.0	0.0	±0.152
9	Ipswich ..	—	—	—	—	+2.7	−1.5	−5.1	±3.36
10	King's Lynn	+1.24	+0.07	+0.55	±1.44	−0.3	+0.3	+1.7	±1.46
11	Newark ..	+0.35	+4.54*	−0.62	±1.89	—	—	—	—
12	Oaklands ..	+1.71	+0.53	−1.57	±1.01	—	—	—	—
13	Peterborough	—	—	—	—	−0.1	+0.1	+2.0	±2.50
14	Poppleton ..	−1.11	+3.42	−1.03	±2.04	−1.0	−0.2	−0.4	±0.524
15	Wissington	—	—	—	—	−0.1	+0.8	+0.9	±0.556
	Mean ..	*+0.15*	*+0.54*	*−0.19*		*+0.3*	*0.0*	*−0.5*	

† Old convention as to factor ½ (see page 128)

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