ROTHAMSTED RESEARCH

Rothamsted Report for 1932

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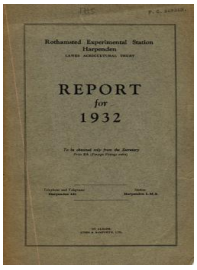

Other Experiments at Rothamsted

Rothamsted Research

Rothamsted Research (1933) *Other Experiments at Rothamsted ;* Rothamsted Report For 1932, pp 136 - 162 **- DOI: https://doi.org/10.23637/ERADOC-1-64**

Replicated Experiments at Rothamsted

HAY

Temporary Leys.—Clover, ryegrass and fallow, following barley, and preceding wheat.

RH—Fosters—1932

Plan and yields in lb.—First crop, green weights.

1 8

238 R 216 S O	L.F. I.F. O I.F. L.F. O S	188 C 172 O S	311 CR 307 S O
L.F. L.F. O I.F. I.F. O S	240 R 233 S O	286 CR 318 S O	133 C 100 S O
286 CR 296 O S	212 C 200 O S	220 R 186 S O	L.F. I.F. O I.F. L.F. S O
149 C 169 S O	278 CR 315 S O	I.F. L.F. O L.F. I.F. S O	218 R 236 O S

W ↑

57 4

Second crop, green weights.

14	13	L.F.	I.F.				54
		I.F.	L.F.	51	70	73	
L.F.	L.F.					49	16
I.F.	I.F.	13	12	71	74		
	77			13	12	L.F.	I.F.
66		78	94			I.F.	L.F.
			96	I.F.	L.F.	13	
*	*	74		L.F.	I.F.		18

*The crop on these two plots was too small to be weighed.

SYSTEM OF REPLICATION: 4 × 4 Latin square for different leys, with plots sub-divided into two for nitrogen in 1931, and half plots sub-divided into two after first cut, one half being summer fallowed, the other cut a second time. The plots without leys were sub-divided for light fallow (L.F.) and intensive fallow (I.F.).

AREA OF EACH QUARTER-PLOT: 0.02618 acre (59.5 × 44.0 links).

TREATMENTS: No ley (O), Clover (C), Ryegrass (R), and Clover and Ryegrass (CR). In 1931 half-plots received no nitrogen (O) and sulphate of ammonia (S) at the rate of 0.2 cwt. N per acre.

SEED SOWN: April 23rd, 1931. Cut: 1st crop, June 22nd; 2nd crop, August 29th.

PREVIOUS CROP: Barley.

https://doi.org/10.23637/ERADOC-1-64

SUMMARY OF RESULTS

DRY MATTER

	Ryegrass	Clover	Clover and Ryegrass	*Mean*
FIRST CROP Cwt. per acre				
No Nitrogen ..	26.6	20.0	39.0	*28.5*
Nitrogen	29.0	19.3	36.9	*28.4*
Mean	*27.8*	*19.6*	*37.9*	*28.4*
Difference ..	*+2.4*	*−0.7*	*−2.1*	*−0.1*
Per Cent.				
No Nitrogen ..	93.4	70.2	137.0	*100.2*
Nitrogen	102.1	67.8	129.6	*99.8*
Mean	*97.7*	*69.0*	*133.3*	*100.0*
Difference ..	*+8.7*	*−2.4*	*−7.4*	*−0.4*
SECOND CROP Cwt. per acre				
No Nitrogen ..	2.7	6.3	12.9	*7.3*
Nitrogen	3.2	9.1	12.7	*8.3*
Mean	*2.9*	*7.7*	*12.8*	*7.8*
Difference ..	*+0.5*	*+2.8*	*−0.2*	*+1.0*
Per Cent.				
No Nitrogen ..	34.5	80.6	165.1	*93.4*
Nitrogen	40.6	116.8	162.4	*106.6*
Mean	*37.5*	*98.7*	*163.7*	*100.0*
Difference ..	*+6.1*	*+36.2*	*−2.7*	*+13.2*

CONCLUSIONS

The differences between the different leys are significant, but the significance of the residual nitrogen effects is doubtful.

https://doi.org/10.23637/ERADOC-1-64

BARLEY

Variety Trial.
Comparison of Early and Late sowing.
Effect of Superphosphate and Sulphate of Ammonia.

RB—Fosters, 1932

Plan and yields in lb.

	Treatment.	Grain.	Straw.		Treatment.	Grain.	Straw.	
48	CN – L	43.6	41.9		CN – E	27.9	29.1	96
	BN – L	49.9	44.6		C – PL	25.6	21.1	
	B – – L	44.6	37.9		B – PL	37.3	32.0	
	CN – E	35.4	31.9		CNPE	29.2	30.8	
	CNPL	38.8	36.4		A – – E	35.6	33.9	
	ANPE	52.2	53.6		ANPL	40.8	52.5	
	B – PL	44.6	44.1		B – – E	33.6	29.4	
	ANPL	43.7	62.1		BN – L	41.1	33.4	
	CNPE	35.6	33.4		A – PE	37.9	36.6	
	A – – L	41.4	58.1		AN – L	40.3	51.7	
	BNPE	44.7	43.8	N	CNPL	26.8	24.7	
	AN – E	51.1	58.1	↑	C – PE	22.1	20.4	
	BN – E	51.6	48.6		C – – E	21.4	27.1	
	B – PE	46.4	43.1		B – – L	37.0	33.3	
	AN – L	42.1	59.9		A – PL	39.3	56.4	
	BNPL	57.3	61.2		ANPE	49.4	47.1	
	A – PL	44.6	62.6		C – – L	27.5	23.2	
	C – PL	36.5	35.5		BNPE	45.8	41.7	
	C – PE	33.4	30.9		BNPL	39.4	35.3	
	A – PE	48.6	49.9		CN – L	28.2	25.8	
	B – – E	39.8	38.5		BN – E	42.9	37.3	
	C – – L	28.1	30.9		B – PE	35.2	31.6	
	A – – E	49.1	57.1		A – – L	32.4	45.6	
	C – – E	36.1	36.1		AN – E	49.0	55.5	
	AN – E	59.6	74.4		ANPE	48.9	53.1	
	CN – L	34.5	44.8		BNPL	32.1	38.9	
	A – PL	46.6	73.4		A – – L	33.5	49.8	
	C – – L	27.0	32.0		B – PE	37.3	35.2	
	CN – E	43.6	41.6		BN – E	40.2	37.8	
	B – – E	50.8	47.2		A – PE	34.8	38.2	
	B – PL	44.6	46.1		C – – E	19.6	20.2	
	B – PE	54.0	47.2		ANPL	39.3	62.2	
	CNPL	30.6	34.9		AN – L	33.6	52.4	
	B – – L	49.7	46.6		AN – E	50.8	59.2	
	BNPL	51.5	50.2		A – PL	31.4	41.8	
	C – – E	38.2	36.0		CNPL	16.6	19.9	
	C – PE	42.4	40.6		A – – E	29.6	35.1	
	A – – E	51.5	60.2		C – PE	22.6	23.2	
	BN – E	55.1	45.9		BN – L	31.9	28.6	
	AN – L	45.4	77.1		B – – E	31.8	28.0	
	C – PL	35.4	36.6		C – – L	9.4	12.8	
	A – PE	59.0	64.2		CN – L	13.6	15.4	
	ANPE	59.4	66.6		B – PL	32.0	24.5	
	CNPE	44.8	40.5		C – PL	12.2	12.8	
	BNPE	56.0	50.2		BNPE	41.1	35.1	
	ANPL	45.2	86.0		CN – E	27.2	24.8	
	A – – L	40.9	80.1		B – – L	29.4	25.4	
1	BN – L	36.2	41.8		CNPE	26.8	23.9	49

https://doi.org/10.23637/ERADOC-1-64

DETAILS.

SYSTEM OF REPLICATION : 4 randomised blocks of 24 plots each.

AREA OF EACH PLOT : 1/70th acre (144.3 × 9.9 links).

TREATMENTS AND VARIETIES :

All combinations of :

(*a*) { — No nitrogen.
N Sulphate of ammonia (0.2 cwt. N per acre).

(*b*) { — No phosphate.
P Superphosphate (0.5 cwt. P_2O_5 per acre).

(*c*) { E Early sowing (Mar. 4th).
L Late sowing (April 6th).

(*d*) { A Plumage-Archer.
B Victory.
C July.

SEED SOWN : Mar. 4th, 5th, 8th and April 6th.

HARVESTED : Aug. 10-30th.

PREVIOUS CROP : Seeds Hay.

SUMMARY OF RESULTS

		Early Sowing			Late Sowing		
		Plumage Archer	Victory	July	Plumage Archer	Victory	July
GRAIN Cwt. per acre							
No Sulph. Amm.	No Super. ..	25.9	24.4	18.0	23.2	25.1	14.4
	Super. ..	28.2	27.0	18.8	25.3	24.8	17.1
Sulph. Amm.	No Super. ..	32.9	29.6	21.0	25.2	24.8	18.7
	Super. ..	32.8	29.3	21.3	26.4	28.2	17.6
Per Cent.							
No Sulph. Amm.	No Super. ..	107.2	100.8	74.5	95.8	103.9	59.5
	Super. ..	116.6	111.8	77.9	104.6	102.5	70.9
Sulph. Amm.	No Super. ..	136.1	122.7	86.7	104.3	102.8	77.5
	Super. ..	135.7	121.3	88.2	109.2	116.6	72.9
STRAW Cwt. per acre							
No Sulph. Amm.	No Super. ..	29.1	22.4	18.6	36.5	22.4	15.4
	Super. ..	29.5	24.5	18.0	36.6	22.9	16.6
Sulph. Amm.	No Super. ..	38.6	26.5	19.9	37.7	23.2	20.0
	Super. ..	34.4	26.7	20.1	41.1	29.0	18.1
Per Cent.							
No Sulph. Amm.	No Super. ..	111.3	85.5	71.3	139.5	85.5	59.1
	Super. ..	112.8	93.8	68.7	139.9	87.6	63.3
Sulph. Amm.	No Super. ..	147.6	101.3	76.1	144.0	88.6	76.4
	Super. ..	131.6	102.0	76.8	157.0	110.8	69.2

Standard error of single entry : Grain, 1.359 cwt., or 5.62 per cent.
Straw, 1.562 cwt., or 5.98 per cent.

https://doi.org/10.23637/ERADOC-1-64

Differences between varieties

	Plumage Archer	Victory	July	*Mean*
GRAIN. Cwt. per acre				
Early	29.9	27.6	19.8	*25.8*
Late	25.0	25.7	17.0	*22.6*
Mean	*27.5*	*26.6*	*18.4*	*24.2*
Per cent.				
Early	123.9	114.2	81.8	*106.6*
Late	103.5	106.4	70.2	*93.4*
Mean	*113.7*	*110.3*	*76.0*	*100.0*
STRAW. Cwt. per acre				
Early	32.9	25.0	19.2	*25.7*
Late	38.0	24.4	17.5	*26.6*
Mean	*35.4*	*24.7*	*18.3*	*26.2*
Per cent.				
Early	125.8	95.6	73.2	*98.2*
Late	145.1	93.2	67.0	*101.7*
Mean	*135.5*	*94.4*	*70.1*	*100.0*

Standard error of single entry—Grain: 0.680 cwt., or 2.81 per cent.
Straw: 0.781 cwt., or 2.99 per cent.

Nitrogenous Effects

	Early	Late	*Mean*
GRAIN. Cwt. per acre			
No Sulph. Amm.	23.7	21.6	*22.7*
Sulph. Amm.	27.8	23.5	*25.7*
Mean	*25.8*	*22.6*	*24.2*
Per cent.			
No Sulph. Amm.	98.1	89.5	*93.8*
Sulph. Amm.	115.1	97. 2	*106.2*
Mean	*106.6*	*93.4*	*100.0*
STRAW. cwt. per acre			
No Sulph. Amm.	23.7	25.1	*24.4*
Sulph. Amm.	27.7	28.2	*27.9*
Mean	*25.7*	*26.6*	*26.2*
Per cent.			
No Sulph. Amm.	90.6	95.8	*93.2*
Sulph. Amm.	105.9	107.7	*106.8*
Mean	*98.2*	*101.7*	*100.0*

Standard error of single entry—Grain: 0.555 cwt., or 2.29 per cent.
Straw: 0.638 cwt., or 2.44 per cent.

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Phosphatic Effects

	Early	Late	*Mean*
GRAIN cwt. per acre			
No Super.	25.3	21.9	*23.6*
Super.	26.2	23.2	*24.7*
Mean	*25.8*	*22.6*	*24.2*
Per cent.			
No Super.	104.7	90.6	*97.6*
Super.	108.6	96.1	*102.3*
Mean	*106.6*	*93.4*	*100.0*
STRAW cwt. per acre			
No Super.	25.8	25.9	*25.9*
Super.	25.5	27.4	*26.4*
Mean	*25.7*	*26.6*	*26.2*
Per cent.			
No Super.	98.8	98.9	*98.8*
Super.	97.6	104.6	*101.1*
Mean	*98.2*	*101.7*	*100.0*

Standard errors: Same as for nitrogenous effects.

CONCLUSIONS

The yields of Plumage Archer and Victory are significantly greater than those of July for both grain and straw. The yields of Plumage Archer are significantly greater than Victory in the case of the straw only, this difference being significantly greater for late sowing.

The early sowing gives a significantly greater yield of grain than the late sowing.

There is a significant response to sulphate of ammonia both by the grain and straw, and to superphosphate by the grain only. The response to sulphate of ammonia by the grain is significantly greater in the early sowings.

In yields of grain the three varieties show no significant differences in response to any of the factors tested.

https://doi.org/10.23637/ERADOC-1-64

WHEAT

Effect of spring and autumn application of nitrogen, in the form of sulphate of ammonia and cyanamide, in relation to previous temporary ley.

RW—Long Hoos, 1932

Sample weights in grams—Grain above, straw below.

1								8
SEL	SL	CEL	SE	—	CL	SL	CE	
822	819	792	685	657	807	672	632	
1770	1654	1728	1536	1548	1789	1780	1467	
CEL	CL	SEL	CE	—	SL	CL	SE	
908	971	687	810	801	909	800	713	
1938	1696	1656	1731	1378	2123	1858	1465	
R—2		R—1		O—2		O—1		
SE	—	—	SL	CE	SEL	—	CEL	
954	899	872	751	922	834	897	775	
1673	1476	1462	1836	1989	1955	1778	1576	
CE	—	—	CL	SE	CEL	—	SEL	
792	964	758	845	946	913	888	707	
1447	1514	1554	1832	1881	1920	1708	1449	
CE	SEL	CEL	SL	CEL	CE	CL	SEL	
863	678	929	875	811	911	829	878	
1557	1616	1730	1610	1540	1719	1538	1524	
SE	CEL	SEL	CL	SEL	SE	SL	CEL	
961	816	834	1055	763	832	1028	809	
1657	1489	1638	1815	1732	1610	2052	1478	
O—1		R—2		R—1		O—2		
SL	—	CE	—	CL	—	CE	—	
754	961	952	1032	900	922	915	627	
1883	1541	1670	1860	1692	1490	1722	1440	
CL	—	SE	—	SL	—	SE	—	
1015	839	880	995	952	776	784	810	
1724	1522	1517	1781	1712	1362	1416	1430	
CL	CE	SE	CEL	SEL	CE	SEL	SL	
904	1001	755	811	772	935	654	638	
1704	1684	1390	1764	1713	1662	1318	1178	
SL	SE	CE	SEL	CEL	SE	CEL	CL	
990	688	892	813	850	897	678	712	
1662	1376	1682	1518	1596	1616	1332	1238	
R—1		O—2		O—1		R—2		
—	SEL	CL	—	—	CL	SE	—	
951	884	882	972	778	1036	638	758	
1444	1808	1547	1648	1314	1956	1219	1366	
—	CEL	SL	—	—	SL	CE	—	
970	954	906	760	903	880	689	644	
1429	1680	1718	1600	1566	1730	1218	1188	
—	SL	—	CEL	CEL	—	SL	SEL	
962	824	701	780	838	923	656	624	
1573	1538	1236	1655	1442	1478	1309	1466	
—	CL	—	SEL	SEL	—	CL	CEL	
1173	786	774	672	805	828	798	599	
1870	1343	1286	1445	1562	1358	1384	1276	
O—2		O—1		R—2		R—1		
SE	SEL	SL	CE	CE	SL	—	CE	
854	827	864	815	717	790	685	577	
1482	1516	1668	1524	1211	1446	1220	980	
CE	CEL	CL	SE	SE	CL	—	SE	
656	728	753	735	818	843	606	561	
121 1218	1382	1493	1566	1482	1606	1300	1248	128

N ↑

DETAILS

SYSTEM OF REPLICATION : 4 × 4 Latin square for different leys, with each plot sub-divided into four for times of application of nitrogen, and each quarter plot sub-divided into two for kind of nitrogen.
AREA OF EACH EIGHTH PLOT : 1/80th acre (39.5 × 31.6 links).
MAIN PLOT TREATMENTS : Clover (O), 1 cut and 2 cuts ; clover and ryegrass (R), 1 cut and 2 cuts.
QUARTER PLOT TREATMENTS : Nitrogenous dressings of 0.3 cwt. N. per acre applied early (E), late (L), both early and late (EL), or no nitrogen (—).
EIGHTH PLOT TREATMENTS : Sulphate of ammonia (S) and Cyanamide (C).
HARVESTING : By sampling method ; 16 one-metre lengths per eighth-plot, drills set 6 ins. apart.
VARIETY : Victor.
MANURES APPLIED : Early, October 29th, 1931 ; late, March 24th.
SEED SOWN : October 31st.
HARVESTED : Aug. 17th-20th.
PREVIOUS CROP : Temporary ley.

SUMMARY OF RESULTS

GRAIN

		Clover		Clover and Ryegrass		*Mean*
		1 Cut	2 Cuts	1 Cut	2 Cuts	
Cwt. per acre						
No Nitrogen		27.5	27.6	26.7	28.8	*27.6*
Early	Cyanamide	26.5	27.6	26.9	25.7	*26.7*
	Sulph. Amm.	27.0	27.3	22.6	26.9	*26.0*
	Mean	*26.8*	*27.4*	*24.8*	*26.3*	*26.3*
Late	Cyanamide	29.4	27.0	28.1	29.2	*28.4*
	Sulph. Amm.	25.9	29.9	27.3	25.5	*27.2*
	Mean	*27.6*	*28.4*	*27.7*	*27.4*	*27.8*
Early and Late	Cyanamide	26.3	26.6	25.8	27.4	*26.5*
	Sulph. Amm.	23.1	27.4	24.2	25.4	*25.0*
	Mean	*24.7*	*27.0*	*25.0*	*26.4*	*25.8*
Mean		*26.6*	*27.6*	*26.0*	*27.2*	*26.9*
Per cent.						
No Nitrogen		102.4	102.7	99.3	107.0	*102.8*
Early	Cyanamide	98.6	102.8	100.2	95.7	*99.3*
	Sulph. Amm.	100.4	101.4	84.0	99.9	*96.4*
	Mean	*99.5*	*102.1*	*92.1*	*97.8*	*97.9*
Late	Cyanamide	109.5	100.4	104.7	108.8	*105.8*
	Sulph. Amm.	96.3	111.4	101.7	94.8	*101.0*
	Mean	*102.9*	*105.9*	*103.2*	*101.8*	*103.4*
Early and Late	Cyanamide	97.8	99.0	95.8	101.8	*98.6*
	Sulph. Amm.	85.9	101.8	89.8	94.6	*93.0*
	Mean	*91.8*	*100.4*	*92.8*	*98.2*	*95.8*
Mean		*99.1*	*102.8*	*96.8*	*101.2*	*100.0*

Standard Errors : See next table.

https://doi.org/10.23637/ERADOC-1-64

STRAW

		Clover		Clover and Ryegrass		*Mean*
		1 Cut	2 Cuts	1 Cut	2 Cuts	
Cwt. per acre						
No Nitrogen		48.8	51.0	46.0	49.1	*48.7*
Early	Cyanamide	50.7	54.0	49.9	45.3	*50.0*
	Sulph. Amm.	51.5	50.4	47.1	48.1	*49.3*
	Mean	*51.1*	*52.2*	*48.5*	*46.7*	*49.6*
Late	Cyanamide	57.4	50.8	54.0	51.9	*53.5*
	Sulph. Amm.	57.6	60.7	53.2	48.1	*54.9*
	Mean	*57.5*	*55.8*	*53.6*	*50.0*	*54.2*
Early and Late	Cyanamide	51.6	53.4	50.8	52.6	*52.1*
	Sulph. Amm.	50.8	53.2	54.4	51.3	*52.4*
	Mean	*51.2*	*53.3*	*52.6*	*52.0*	*52.2*
Mean		*52.2*	*53.1*	*50.2*	*49.5*	*51.2*
Per cent.						
No Nitrogen		95.3	99.6	89.8	95.8	*95.1*
Early	Cyanamide	99.0	105.4	97.5	88.4	*97.6*
	Sulph. Amm.	100.5	98.4	92.0	93.9	*96.2*
	Mean	*99.8*	*101.9*	*94.8*	*91.2*	*96.9*
Late	Cyanamide	112.1	99.1	105.4	101.3	*104.5*
	Sulph. Amm.	112.6	118.5	104.0	93.9	*107.2*
	Mean	*112.4*	*108.8*	*104.7*	*97.6*	*105.9*
Early and Late	Cyanamide	100.7	104.4	99.2	102.7	*101.8*
	Sulph. Amm.	99.2	103.9	106.2	100.3	*102.4*
	Mean	*100.0*	*104.2*	*102.7*	*101.5*	*102.1*
Mean		*101.9*	*103.6*	*98.0*	*96.5*	*100.0*

Each yield in the above tables (except No N) is the mean of 4 eighth plots.

The standard errors of single whole plots (appropriate to direct comparisons between the different leys), to single quarter plots (appropriate to direct comparisons between times of application of nitrogen, and their interactions with leys), and to single eighth plots (appropriate to all comparisons involving the difference of cyanamide and sulphate of ammonia), are :

	Grain.	*Straw.*
Whole plots	1.91 cwt., or 7.08 per cent.	2.40 cwt., or 4.70 per cent.
Quarter plots	2.23 cwt., or 8.27 per cent.	4.01 cwt., or 7.84 per cent.
Eighth plots	2.50 cwt., or 9.28 per cent.	3.62 cwt., or 7.07 per cent.

https://doi.org/10.23637/ERADOC-1-64

Mean of Cyanamide and Sulphate of Ammonia and all leys.

	Not Early	Early	*Mean*
GRAIN Cwt. per acre			
Not Late	27.6	26.3	*27.0*
Late	27.8	25.8	*26.8*
Mean	*27.7*	*26.0*	*26.9*
Per cent.			
Not Late	102.8	97.9	*100.4*
Late	103.4	95.8	*99.6*
Mean	*103.1*	*96.8*	*100.0*
STRAW Cwt. per acre			
Not late	48.7	49.6	*49.2*
Late	54.2	52.2	*53.2*
Mean	*51.4*	*50.9*	*51.2*
Per cent.			
Not late	95.1	96.9	*96.0*
Late	105.9	102.1	*104.0*
Mean	*100.5*	*99.5*	*100.0*

Standard errors of single entries: Grain, 0.556 cwt., or 2.07 per cent.
Straw, 1.00 cwt., or 1.96 per cent.

https://doi.org/10.23637/ERADOC-1-64

Difference of Cyanamide (+) and Sulphate of Ammonia (−)

	Clover		Clover + Ryegrass		
	1 Cut	2 Cuts	1 Cut	2 Cuts	*Mean*
GRAIN Cwt. per acre					
Early	−0.5	+0.4	+4.4	−1.1	*+0.8*
Late	+3.5	−3.0	+0.8	+3.7	*+1.2*
Early and Late ..	+3.2	−0.7	+1.6	+2.0	*+1.5*
Mean	*+2.1*	*−1.1*	*+2.3*	*+1.5*	*+1.2*
Per cent.					
Early	− 1.8	+ 1.4	+16.2	− 4.2	*+2.9*
Late	+13.2	−11.0	+ 3.0	+14.0	*+4.8*
Early and Late ..	+11.9	− 2.8	+ 6.0	+ 7.2	*+5.6*
Mean	*+ 7.8*	*− 4.1*	*+ 8.4*	*+ 5.7*	*+4.4*
STRAW Cwt. per acre					
Early	−0.8	+3.6	+2.8	−2.8	*+0.7*
Late	−0.2	−9.9	+0.8	+3.8	*−1.4*
Early and Late ..	+0.8	+0.2	−3.6	+1.3	*−0.3*
Mean	*0.0*	*−2.0*	*0.0*	*+0.6*	*−0.3*
Per cent.					
Early	− 1.5	+ 7.0	+ 5.5	− 5.5	*+1.4*
Late	− 0.5	−19.4	+ 1.4	+ 7.4	*−2.7*
Early and Late ..	+ 1.5	+ 0.5	− 7.0	+ 2.4	*−0.6*
Mean	*− 0.1*	*− 4.0*	*0.0*	*+ 1.4*	*−0.6*

Standard errors of single differences—*Grain:* 1.77 cwt., or 6.58 per cent.
Straw: 2.56 cwt., or 5.00 per cent.

CONCLUSIONS

The lower yield of straw on the plots with ryegrass is barely significant. There are no other direct effects of the temporary ley approaching significance, but the design of the experiment does not permit of very precise conclusions on these points.

Nitrogen given early significantly depresses the yield of grain, but not the straw, while nitrogen given late significantly raises the yield of the straw, but not the grain. The different leys produce no significant differences in the average nitrogen effects.

The sulphate of ammonia plots give significantly lower yields of grain than the cyanamide plots, and for both grain and straw the differences between sulphate of ammonia and cyanamide for the different leys and times of application are somewhat irregular.

https://doi.org/10.23637/ERADOC-1-64

WHEAT

Comparison of sulphate of ammonia (repeated and spring application) with cyanamide and dicyanodiamide (applied in autumn).

RW—Fosters, 1932

Plan and yields in lb., grain above, straw below.

129 133

D 72.2 92.8	**S.S** 55.4 73.9	**O** 36.6 48.2	**C** 67.9 79.1	**S** 73.0 91.5
O 36.4 46.6	**C** 46.9 60.1	**S.S** 46.8 63.5	**S** 54.9 74.6	**D** 68.5 89.2
S.S 71.5 91.2	**S** 55.6 67.6	**D** 71.6 92.1	**O** 67.5 80.8	**C** 78.4 101.6
S 68.9 88.6	**O** 53.2 62.6	**C** 69.8 91.2	**D** 79.6 102.1	**S.S** 77.2 110.3
C 82.0 106.2	**D** 81.0 112.8	**S** 76.0 105.5	**S.S** 87.9 123.9	**O** 70.9 87.4

149 153

W ↑

SYSTEM OF REPLICATION : 5 × 5 Latin square.
AREA OF EACH PLOT : 1/40th acre (33.5 × 74.6 links).
VARIETY : Victor.
TREATMENTS : No nitrogen (O), sulphate of ammonia in spring (S), and divided into six monthly dressings (November to April) (S.S.) ; cyanamide in autumn (C), and nitrogen applied in autumn, half as cyanamide and half as dicyanodiamide (D). N at the rate of 0.3 cwt. per acre.
MANURES APPLIED : Divided dressings : November 24th, December 12th, January 25th, February 26th, March 15th, April 16th.
SPRING DRESSING : March 24th.
AUTUMN DRESSING : October 28th.
SEED SOWN : November 2nd.
HARVESTED : August 16th.
PREVIOUS CROP : Seeds Hay.

SUMMARY OF RESULTS

	No Nitrogen	S/Amm. Spring	S./Amm. Nov.-April	Cyan. Autumn	Cyan. + Dicy. Autumn	*Mean*	Standard Error
GRAIN							
Cwt. per Acre ..	18.9	23.4	24.2	24.6	26.6	*23.6*	0.655
Per Cent. ..	80.2	99.5	102.7	104.5	113.0	*100.0*	2.78
STRAW							
Cwt. per Acre ..	23.2	30.6	33.0	31.3	34.9	*30.6*	1.02
Per cent ..	75.9	99.8	108.0	102.2	114.1	*100.0*	3.32

CONCLUSIONS

Significant response to nitrogen, both in the grain and straw. The mixture of cyanamide and dicyanodiamide gives a significantly greater yield than the cyanamide alone. The differences between sulphate of ammonia in the spring and cyanamide in the autumn, and the differences due to variation in the time of application of the sulphate of ammonia, are not significant.

https://doi.org/10.23637/ERADOC-1-64

FORAGE MIXTURE

VARIATION IN PROPORTION OF OATS AND VETCHES.

RF—Great Knott, 1932

Plan and total produce in lbs. (weighed green).

20					50
BN 402		A— 235		AN 303	
CN 419		E— 201		D— 325	
A— 325		DN 286		E— 247	N
C— 363		AN 290		DN 316	↑
E— 291		B— 271		BN 347	
B— 368		C— 293		C— 339	
AN 379		D— 271		A— 272	
EN 304		CN 409		EN 236	
DN 385		BN 401		CN 339	
D— 356		EN 327		B— 288	41
BN 390		C— 420			
C— 373		BN 439			
DN 388		EN 301			
A— 297		D— 394			
E— 272		E— 331			
AN 373		DN 417			
CN 377		B— 409			
D— 338		A— 276			
B— 325		CN 456			
1 EN 300		AN 443			21

SYSTEM OF REPLICATION : 5 randomised blocks of 10 plots each.
AREA OF EACH PLOT : 1/80th acre (126.3 × 9.9 links).
TREATMENTS : All combinations of :

(*a*) Seedings (1 unit=50 lb. per acre).

	A	B	C	D	E
Oats (units) ..	4	3	2	1	0
Vetches (units) ..	0	1	2	3	4

(*b*) — No nitrogen.
N 0.3 cwt. N per acre as sulphate of ammonia.

BASAL MANURING : Muriate of potash at the rate of 0.5 cwt. K_2O per acre, and superphosphate at the rate of 0.5 cwt. P_2O_5 per acre.
MANURES APPLIED : March 3rd-4th.
SEED SOWN : March 11th-12th.
HARVESTED : July 11th-12th.
PREVIOUS CROP : Beans followed by wheat which was ploughed in.

SUMMARY OF RESULTS

FRESH MATERIAL

	4 Oats 0 Vetches	3 Oats 1 Vetches	2 Oats 2 Vetches	1 Oats 3 Vetches	0 Oats 4 Vetches	*Mean*
Cwt. per acre						
Without Nitrogen ..	200.7	237.3	255.4	240.6	191.7	*225.1*
With Nitrogen ..	255.4	282.7	285.7	256.0	209.7	*257.9*
Mean	*228.1*	*260.0*	*270.6*	*248.3*	*200.7*	*241.5*
Per Cent.						
Without Nitrogen ..	83.1	98.2	105.8	99.6	79.4	*93.2*
With Ntirogen ..	105.8	117.0	118.3	106.0	86.8	*106.8*
Mean	*94.4*	*107.6*	*112.0*	*102.8*	*83.1*	*100.0*

Standard error of single entry : 8.97 cwt., or 3.70 per cent.

https://doi.org/10.23637/ERADOC-1-64

TOTAL DRY MATTER

Determined on single samples from each plot, Oats and Vetches being separated in the sample

		4 Oats 0 Vetches	3 Oats 1 Vetches	2 Oats 2 Vetches	1 Oats 3 Vetches	0 Oats 4 Vetches	*Mean*
Cwt. per acre							
Oats	Without Nitrogen	42.9	36.6	30.5	21.7		*32.9*
	With Nitrogen ..	53.5	44.4	41.0	26.0		*41.2*
Vetches	Without Nitrogen		11.0	18.4	23.9	28.6	*20.5*
	With Nitrogen ..		8.6	14.9	19.1	30.9	*18.4*
Total Dry Matter	Without Nitrogen ..	42.9	47.6	48.9	45.6	28.6	*42.7*
	With Nitrogen ..	53.5	53.1	55.8	45.2	30.9	*47.7*
	Mean	*48.2*	*50.4*	*52.4*	*45.4*	*29.8*	*45.2*

Standard error single entry: Total dry matter : 1.71 cwt., or 3.78 per cent.

PERCENTAGE NITROGEN IN DRY MATTER

(Replicates Bulked)

	4 Oats 0 Vetches	3 Oats 1 Vetches	2 Oats 2 Vetches	1 Oats 3 Vetches	0 Oats 4 Vetches
OATS					
Without Nitrogen ..	1.145	1.329	1.287	1.401	—
With Nitrogen ..	1.158	1.197	1.247	1.361	—
VETCHES					
Without Nitrogen ..	—	2.702	2.725	2.865	3.061
With Nitrogen ..	—	2.659	2.761	2.908	2.993

CONCLUSIONS

The differences between the different seedings are significant. Sulphate of ammonia produces a significant increase in the yield of green produce of all mixtures, the increase being significantly greater when oats predominate. The results indicate that for green produce the optimum mixture without nitrogen is 102 lbs. oats and 98 lbs. vetches per acre ($\pm$4.9 lbs.), and that the optimum mixture with nitrogen is 123 lbs. oats and 77 lbs. vetches per acre ($\pm$7.0 lbs.). The difference between these optima is significant.

The total dry matter of the first three mixtures is significantly increased by the application of sulphate of ammonia. Total dry matter reaches a maximum with a seeding rate of 110 lbs. oats and 90 lbs. vetches where no nitrogen is given, and with a mixture somewhat richer in oats when nitrogen is given.

The total nitrogen content of the crop is not appreciably altered by the application of nitrogen, and the nitrogen percentage of the oats is actually somewhat lower on the plots receiving nitrogen. The total nitrogen content is a maximum for a mixture of 50 lbs. oats and 150 lbs. vetches per acre.(See Fig. 1, p. 27).

https://doi.org/10.23637/ERADOC-1-64

WINTER FORAGE

DIFFERENT SEEDS MIXTURES.

RF—Fosters, 1931-2

Plan and yields in lb.—Green weights (1st cut above, 2nd cut below).

145 W		G		B		R		O		O		G		W		R		B 164	
4	**3**	**1**	**2**	**1**	**3**	**1**	**3**	**4**	**3**	**4**	**1**	**1**	**3**	**4**	**2**	**4**	**1**	**1**	**4**
170	68	94	220	44	85	32	48	167	68	193	32	96	119	192	178	210	44	51	216
172	231	172	170	176	219	170	228	123	167	118	101	162	176	139	124	91	199	170	176
1	**2**	**4**	**3**	**4**	**2**	**2**	**4**	**1**	**2**	**3**	**2**	**4**	**2**	**1**	**3**	**3**	**2**	**2**	**3**
28	152	198	117	200	215	193	192	46	210	88	214	280	269	28	82	128	267	258	155
129	118	172	189	206	194	115	108	113	84	133	67	192	189	156	221	187	85	244	248
3	**2**	**1**	**4**	**1**	**4**	**2**	**3**	**1**	**3**	**1**	**4**	**4**	**2**	**2**	**3**	**1**	**4**	**1**	**2**
58	233	24	238	54	292	266	105	133	164	66	300	250	255	302	109	136	322	271	418
214	86	114	83	148	146	39	108	143	183	178	190	102	122	124	238	84	66	156	163
1	**4**	**3**	**2**	**2**	**3**	**4**	**1**	**2**	**4**	**3**	**2**	**1**	**3**	**1**	**4**	**3**	**2**	**3**	**4**
43	259	81	230	248	57	240	70	306	295	108	254	37	87	77	248	131	290	236	376
142	61	150	101	162	165	43	68	144	165	186	156	138	178	198	101	121	63	163	160
205 R		W		B		O		G		B		W		R		O		G 224	

S ↑

SYSTEM OF REPLICATION : 4 randomised blocks of 5 plots each, for different crops, with each plot sub-divided into four for seed mixtures.

AREA OF EACH SUB-PLOT : 1/50th acre (28.6 × 70 links).

MAIN PLOT TREATMENTS : Rye (R), six-rowed barley (B), grey winter oats (O), wheat (W), and Italian ryegrass (G).

QUARTER PLOT TREATMENTS : 4 bushels of cereal (or 60 lb. ryegrass) (1); 2 bushels of cereal (or 30 lb. ryegrass), 1 of beans, 1 of vetches (2); 4 bushels of cereal (or 60 lbs. ryegrass), undersown with trefoil (3); 2 bushels of cereal (or 30 lb. ryegrass), 1 of beans, 1 of vetches, undersown with trefoil (4).

BASAL MANURING : 3 cwt. sulphate of ammonia (1½ cwt. at sowing, 1½ cwt. in spring), 3 cwt. superphosphate and 2 cwt. 30 per cent. potash manure salt.

SEED SOWN : July 23rd, 1931. Cut: 1st crop, November 17th-18th, 1931 ; 2nd crop, May 24th, 1932.

PREVIOUS CROP : Temporary leys.

SUMMARY OF RESULTS

First Crop

	Cwt. per acre					Per cent.				
	1	2	3	4	*Mean*	1	2	3	4	*Mean*
GREEN MATERIAL										
Wheat	13.1	91.0	35.5	94.9	*58.6*	17.6	122.4	47.8	127.7	*78.8*
Ryegrass	66.3	135.4	71.0	128.2	*100.2*	89.2	182.2	95.5	172.6	*134.9*
Rye ..	21.9	111.0	38.3	101.4	*68.2*	29.4	149.4	51.5	136.5	*91.7*
Barley	24.0	108.8	45.2	112.5	*72.6*	32.3	146.4	60.8	151.4	*97.7*
Oats ..	31.7	109.4	43.8	102.9	*71.9*	42.7	147.2	58.9	138.5	*96.8*
Mean ..	*31.4*	*111.1*	*46.7*	*108.0*	*74.3*	*42.2*	*149.5*	*62.9*	*145.3*	*100.0*
DRY MATTER										
Wheat	1.9	9.7	5.1	11.6	*7.1*	21.2	108.6	57.4	129.8	*79.3*
Ryegrass	8.6	16.0	9.6	14.6	*12.2*	96.1	178.5	107.4	163.5	*136.4*
Rye ..	3.7	13.4	6.0	12.2	*8.8*	41.2	149.8	67.4	136.1	*98.6*
Barley	3.1	11.9	5.8	11.6	*8.1*	35.0	133.6	64.9	129.8	*90.8*
Oats ..	3.9	13.1	4.9	12.0	*8.5*	43.7	146.1	54.9	134.8	*94.9*
Mean ..	*4.2*	*12.8*	*6.3*	*12.4*	*8.9*	*47.4*	*143.3*	*70.4*	*138.8*	*100.0*

Standard errors of single entries—Green material : 7.34 cwt., or 9.88 per cent.
Dry matter : Not available.

https://doi.org/10.23637/ERADOC-1-64

Second Crop

	Cwt. per acre					Per cent.				
	1	2	3	4	*Mean*	1	2	3	4	*Mean*
GREEN MATERIAL										
Wheat	59.9	52.1	87.2	55.4	*63.6*	91.0	79.1	132.5	84.1	*96.7*
Ryegrass	70.5	74.2	79.4	77.0	*75.3*	107.1	112.8	120.7	117.0	*114.4*
Rye ..	79.2	45.8	96.8	40.2	*65.5*	120.4	69.6	147.2	61.2	*99.6*
Barley	75.1	84.4	91.3	80.1	*82.7*	114.1	128.2	138.8	121.7	*125.7*
Oats ..	40.9	28.2	59.1	39.1	*41.8*	62.2	42.9	89.8	59.4	*63.6*
Mean ..	*65.1*	*56.9*	*82.8*	*58.3*	*65.8*	*99.0*	*86.6*	*125.8*	*88.7*	*100.0*
DRY MATTER										
Wheat	12.6	10.3	17.3	10.0	*12.6*	94.7	77.0	130.6	75.4	*94.4*
Ryegrass	16.0	16.3	17.5	16.8	*16.6*	121.0	123.3	132.2	126.6	*125.8*
Rye ..	18.0	8.9	19.7	8.4	*13.8*	136.1	67.2	148.4	63.4	*103.8*
Barley	13.1	14.2	16.4	12.5	*14.0*	98.8	107.0	123.8	94.4	*106.0*
Oats ..	9.5	6.5	12.7	8.3	*9.2*	71.9	49.2	95.7	62.6	*69.8*
Mean ..	*13.8*	*11.2*	*16.7*	*11.2*	*13.2*	*104.5*	*84.7*	*126.1*	*84.5*	*100.0*

Standard errors of single entries—Green material : 4.23 cwt., or 6.4 per cent.
Dry matter : Not available.

CONCLUSIONS (Green Material)

In the autumn crop the yield of rye grass is significantly greater than all the cereals, but there are no significant differences between the cereals.

In the spring crop the yields of barley and rye grass are on the average significantly greater than the other types of crop and wheat and rye significantly greater than the oats.

In the autumn crop the yields of mixtures containing beans and vetches are significantly greater than those without beans and vetches. The yields of mixtures without beans and vetches are significantly increased by trefoil.

In the spring crop the rye, wheat and oats mixtures containing beans and vetches yield significantly lower than those without beans and vetches, the effect being most marked in the case of the rye. As before the yields of mixtures without beans and vetches are significantly increased by trefoil.

https://doi.org/10.23637/ERADOC-1-64

FORAGE

EXPERIMENT ON TIMES OF CUTTING

RF—Great Knott, 1932

Plan and yields in lb.—Dry matter.

51 54

3O 74.4 **3S** 95.8	**2S** 63.5 **2O** 61.4	**1S** 23.6 **1O** 18.9	**4S** 93.2 **4O** 90.6
1O 20.7 **1S** 22.5	**4O** 92.2 **4S** 99.9	**3O** 73.8 **3S** 82.5	**2S** 56.2 **2O** 51.0
4O 111.6 **4S** 108.8	**1O** 18.8 **1S** 24.0	**2S** 65.1 **2O** 58.6	**3O** 77.6 **3S** 87.4
2S 61.2 **2O** 54.6	**3O** 79.2 **3S** 86.1	**4S** 83.0* **4O** 80.5	**1O** 16.5 **1S** 19.8

79 82

W ↑

*Estimated.

SYSTEM OF REPLICATION : 4 × 4 Latin square with plots split for sulphate of ammonia.
AREA OF EACH SUB-PLOT : 1/80th acre (50 links × 25 links).
TREATMENTS :
1=Cut second week in June. (June 11th.)
2=Cut three weeks after 1. (July 1st.)
3=Cut three weeks after 2. (July 22nd.)
4=Cut three weeks after 3. (August 12th.)
Sulphate of ammonia (S) at the rate of 0.3 cwt. N per acre.
BASAL DRESSING : Muriate of potash at the rate of 0.5 cwt. K_2O per acre, and superphosphate at the rate of 0.5 cwt. P_2O_5 per acre.
MANURES APPLIED : March 3rd-4th. SEED SOWN : March 11th.
PREVIOUS CROP : Beans, followed by wheat which was ploughed in.

SUMMARY OF RESULTS : DRY MATTER

	(1) Cut 2nd week in June.	(2) Cut three weeks after (1).	(3) Cut three weeks after (2).	(4) Cut three weeks after (3).	*Mean*	Standard Error
Cwt. per acre						
No Sulph. of Amm. ..	13.4	40.3	54.5	66.9	*43.8*	
Sulph. of Amm. ..	16.0	43.9	62.8	68.7	*47.8*	
Mean	*14.7*	*42.1*	*58.6*	*67.8*	*45.8*	*1.84*
Difference	*+2.6*	*+3.6*	*+8.3*	*+1.8*	*+4.0*	*1.54*
Per cent.						
No Sulph. of Amm. ..	29.2	87.9	118.9	146.1	*95.5*	
Sulph. of Amm. ..	35.0	95.9	137.1	150.0	*104.5*	
Mean	*32.1*	*91.9*	*128.0*	*148.0*	*100.0*	*4.03*
Difference	*+5.8*	*+8.0*	*+18.2*	*+3.9*	*+9.0*	*3.36*

CONCLUSIONS

The effects of times of cutting and of nitrogen on the dry matter are both significant, the increase with nitrogen being significantly greatest at the third cutting.

https://doi.org/10.23637/ERADOC-1-64

POTATOES

Effect of Autumn ploughing and sowing of rye.
Application of dung.
Nitrogenous fertiliser : sulphate of ammonia, single and double dressings.
Potassic fertiliser : sulphate of potash, single and double dressings.

RP—Gt. Knott, 1932.

Plan and yields in lb.

1	2N 338	2K 246	1N2K 304		1N2K 305	1N 315	2K 234		1N 332	2N 325	2N2K 339	9
O	2N2K 349	2N1K 355	1N 293	AD	O 248	2N1K 344	2N 375	OD	O 298	1K 279	2K 274	
	1K 249	O 239	1N1K 300		2N2K 359	1K 261	1N1K 315		1N1K 333	2N1K 352	1N2K 312	
	1N 330	2N2K 346	O 248		O 250	1N2K 322	1K 259		1N1K 308	1N 314	2N1K 374	
AR	1N2K 272	2N1K 349	2K 264	A	1N 300	2K 250	1N1K 309	ARD	1N2K 296	2N 340	O 257	
	2N 328	1K 248	1N1K 320		2N 326	2N2K 327	2N1K 349		2K 256	1K 240	2N2K 313	
	1N 322	2N2K 338	2N1K 336		1N1K 314	O 263	2N 328		O 230	1K 217	2K 250	W
ARD	2N 318	2K 253	1N1K 412	OD	2N2K 370	1N2K 311	2N1K 342	AR	1N2K 295	1N1K 297	2N2K 321	
	O 285	1N2K 312	1K 258		2K 276	1N 329	1K 276		2N 320	1N 301	2N1K 340	
	1N2K 336	2K 278	1N 344		1N1K 313	O 255	2K 340		1N1K 306	2K 255	1N2K 316	
OD	2N2K 330	2N1K 354	2N 347	AR	1N 314	2N2K 355	2N1K 310	AD	O 252	2N 333	2N2K 320	
	1N1K 277	O 258	1K 267		2N 359	1N2K 323	1K 241		1N 285	2N1K 334	1K 223	
	1N2K 282	1N1K 323	2N2K 335		1N 334	1N1K 308	O 246		2N1K 261	1N2K 252	O 198	
AD	1N 278	2N 331	2K 249	ARD	1K 248	2K 261	2N1K 309	O	1N 269	2K 187	2N2K 295	
	O 152	2N1K 296	1K 232		2N2K 300	2N 300	1N2K 232		1N1K 190	2N 287	1K 187	
	1N2K 261	1K 207	O 212		2N1K 284	2N 234	1N1K 232		1K 181	2N 284	1N1K 264	
A	2N2K 313	2N 316	2K 219	O	O 227	1N 227	2N2K 256	A	2N2K 235	2K 233	O 229	
154	2N1K 316	1N1K 279	1N 243		1N2K 250	1K 191	2K 207		2N1K 237	1N2K 217	1N 231	162

https://doi.org/10.23637/ERADOC-1-64

DETAILS

SYSTEM OF REPLICATION : 3 randomised blocks of 6 plots, each sub-divided into 9 sub-plots.
AREA OF EACH SUB-PLOT : 1/90th acre. ($63\frac{1}{2} \times 17\frac{1}{2}$ links.)
MAIN PLOT TREATMENTS : No autumn cultivation (O), autumn ploughing (A), autumn ploughing with a catch crop of rye (AR), alone and in combination with dung ; the dung is applied to the autumn ploughed plots before the autumn ploughing, otherwise before the spring ploughing. Dung at the rate of 15 tons per acre in autumn (less in spring proportionately to loss of weight in clamp). All plots spring ploughed.
SUB-PLOT TREATMENTS : Sulphate of ammonia at the rate of 0, 0.4 and 0.8 cwt. N. per acre, and sulphate of potash at the rate of 0, 0.8 and 1.6 cwt., K_2O per acre, in all combinations.
Basal manuring : Superphosphate at the rate of 0.5 cwt. P_2O_5 per acre.
MANURES APPLIED : April 7th. POTATOES PLANTED : April 7th-8th.
VARIETY : Ally. POTATOES LIFTED : September 29th.
PREVIOUS CROP : Beans.

GENERAL SUMMARY.

		No dung.			Dung.		
		Not Autumn ploughed.	Autumn ploughed.	Autumn ploughed and Rye.	Not Autumn ploughed.	Autumn ploughed.	Autumn ploughed and Rye.
Tons per acre							
No sulph. amm.	No potash ..	8.90	9.25	9.82	10.98	8.72	10.55
	Single potash	8.39	8.66	9.46	11.01	9.59	10.00
	Double potash	8.56	9.40	11.44	11.08	9.88	10.32
Single sulph. amm.	No potash	10.56	10.36	12.65	13.47	11.76	12.99
	Single potash	9.66	11.41	12.46	12.37	12.65	13.77
	Double potash	10.80	10.71	11.92	12.83	12.10	11.25
Double sulph. amm.	No potash ..	11.50	12.41	13.48	13.40	13.92	12.84
	Single potash	12.07	12.07	13.38	14.03	13.04	13.65
	Double potash	12.05	11.73	13.70	13.91	13.58	12.73
Per Cent.							
No sulph. amm.	No potash ..	77.1	80.1	85.1	95.1	75.6	91.4
	Single potash	72.7	75.0	82.0	95.4	83.1	86.6
	Double potash	74.2	81.4	99.1	96.0	85.6	89.4
Single sulph. amm.	No potash	91.5	89.8	109.6	116.7	101.9	112.6
	Single potash	83.7	98.9	108.0	107.2	109.6	119.3
	Double potash	93.6	92.8	103.3	111.2	104.9	97.5
Double sulph. amm.	No potash ..	99.6	107.5	116.8	116.1	120.6	111.2
	Single potash	104.6	104.6	116.0	121.6	112.9	118.3
	Double potash	104.4	101.6	118.7	120.5	117.6	110.3

Each yield in the above table is the mean of 3 sub-plots. The standard errors of the yields of single whole plots (appropriate to direct comparisons of dung and cultivations) and of single sub-plots (appropriate to comparisons involving potash and nitrogen and their interactions with dung and cultivations) are :

Whole plots : 0.909 tons or 7.88 per cent.
Sub-plots : 0.860 tons or 7.45 per cent.

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MEAN OF ALL CULTIVATIONS

		No Sulph. Amm.	Single Sulph. Amm.	Double Sulph. Amm.	*Mean*
Tons per acre					
No Dung	No potash	9.32	11.19	12.46	*10.99*
	Single potash ..	8.84	11.18	12.51	*10.84*
	Double potash ..	9.80	11.14	12.49	*11.14*
	Mean	*9.32*	*11.17*	*12.49*	*10.99*
Dung	No potash	10.08	12.74	13.39	*12.07*
	Single potash ..	10.20	12.93	13.57	*12.23*
	Double potash ..	10.43	12.06	13.41	*11.97*
	Mean	*10.24*	*12.58*	*13.46*	*12.09*
Per Cent.					
No Dung	No potash	80.8	97.0	108.0	*95.3*
	Single potash ..	76.6	96.9	108.4	*94.0*
	Double potash ..	84.9	96.6	108.2	*96.6*
	Mean	*80.8*	*96.8*	*108.2*	*95.3*
Dung	No potash	87.4	110.4	116.0	*104.6*
	Single potash ..	88.4	112.0	117.6	*106.0*
	Double potash ..	90.3	104.5	116.1	*103.6*
	Mean	*88.7*	*109.0*	*116.6*	*104.7*

Standard errors: See previous table.

MEAN OF ALL CULTIVATIONS, DUNG AND NO DUNG

	No Sulph. Amm.	Single Sulph. Amm.	Double Sulph. Amm.	*Mean*
Tons per acre				
No potash	9.70	11.97	12.92	*11.53*
Single potash	9.52	12.06	13.04	*11.54*
Double potash	10.11	11.60	12.95	*11.55*
Mean	*9.78*	*11.88*	*12.97*	*11.54*
Per Cent.				
No potash	84.1	103.7	112.0	*99.9*
Single potash	82.5	104.4	113.0	*100.0*
Double potash	87.6	100.5	112.2	*100.1*
Mean	*84.7*	*102.9*	*112.4*	*100.0*

Standard error of single entry: 0.203 tons, or 1.76 per cent.

https://doi.org/10.23637/ERADOC-1-64

MEAN OF ALL LEVELS OF NITROGEN AND POTASH

	Not Autumn ploughed	Autumn ploughed	Autumn ploughed and Rye	*Mean*
Tons per acre				
No Dung	10.28	10.67	12.04	*10.99*
Dung	12.56	11.69	12.01	*12.09*
Mean	*11.42*	*11.18*	*12.02*	*11.54*
Per Cent.				
No Dung	89.0	92.4	104.3	*95.2*
Dung	108.9	101.3	104.0	*104.7*
Mean	*99.0*	*96.9*	*104.2*	*100.0*

Standard error of single entry: 0.525 tons, or 4.55 per cent.

CONCLUSIONS

The rye crop failed. The response to dung, 1.10 tons, is significant, but the autumn ploughing produced no significant effects. (The design of the experiment precludes a very precise verdict on these points.)

Significant response to both dressings of sulphate of ammonia, 2.10 tons for the single dressing and 1.09 tons additional for the double dressing, the additional response being significantly less than the initial response.

Potash produced no apparent effects, nor is there any evidence of interaction between the artificial fertilisers, and the dung or cultivations.

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SUGAR BEET

Effect of nitrate of soda, applied at various times.
Early and late application of minerals.
Ordinary and intensive inter-drill cultivation.

RS—Great Knott, 1932

Plan and yields in lb.

	Treatment.	Roots (unwashed).	Tops.	Sugar per cent.
32	N_2LB	278	250	17.96
	N_2EB	250	230	18.92
	— LA	242	212	19.04
	N_3LA	278	222	18.81
	— LB	221	174	18.92
	— EA	282	224	19.04
	— EB	221	161	19.27
	N_1LB	259	182	18.92
	N_2EA	257	279	18.35
	N_1LA	248	245	19.15
	N_3LB	245	177	19.10
	N_3EB	234	192	19.21
	N_2LA	276	255	18.64
	N_1EB	251	258	18.35
	N_1EA	266	266	18.35
	N_3EA	263	251	19.04
	N_1EA	266	257	18.81
	N_1LB	251	216	18.24
	—EA	264	197	18.70
	N_3LA	261	202	19.61
	N_3EA	278	234	19.10
	N_1LA	271	319	18.47
	N_3LB	248	228	18.75
	N_2LA	270	288	18.47
	N_2EA	262	245	18.81
	N_2LB	256	212	19.21
	—EB	215	159	19.15
	—LA	242	192	19.27
	N_2EB	272	226	19.04
	—LB	224	186	18.92
	N_1EB	233	207	18.70
1	N_3EB	252	205	18.07

W

Treatment.	Roots (unwashed).	Tops.	Sugar per cent.	
— EA	268	269	18.81	64
N_3EA	264	283	18.24	
N_1EA	268	328	17.73	
N_1LA	277	296	18.52	
N_2LB	251	254	18.01	
— LB	242	224	18.58	
— EB	223	194	18.58	
N_3EB	241	216	18.64	
N_2EA	252	296	17.78	
N_2EB	247	226	18.30	
N_1EB	239	223	18.70	
N_2LA	268	264	18.47	
— LA	226	186	18.70	
N_1LB	244	244	18.35	
N_3LB	239	249	18.01	
N_3LA	256	286	18.24	
N_3LB	236	252	17.61	
N_2LB	262	250	18.75	
N_1EA	269	287	18.47	
N_1LA	258	297	18.24	
— LA	263	250	18.92	
N_2LA	271	302	18.24	
N_3EA	263	264	18.52	
N_3LA	270	278	18.70	
— EB	215	179	18.67	
N_2EA	269	246	18.47	
N_2EB	242	213	18.35	
N_1EB	251	230	18.24	
N_3EB	254	241	18,24	
— EA	235	224	18.81	
N_1LB	260	261	18.35	
— LB	232	192	18.58	33

SYSTEM OF REPLICATION : 4 randomised blocks of 16 plots each.
AREA OF EACH PLOT : 1/138th acre. (106.1 × 6.8 links.)
VARIETY : Kuhn.
TREATMENTS : All combinations of :

—	No nitrogen.	E	Basal minerals 3 weeks before sowing.
N_1	Nitrogen 3 weeks before sowing.	L	Basal minerals at sowing.
N_2	Nitrogen at sowing.	A	Ordinary cultivation.
N_3	Nitrogen half at sowing, half at singling.	B	Intensive inter-drill cultivation.

Nitrate of soda at the rate of 0.6 cwt. N per acre.
BASAL MINERALS : Super. at the rate of 0.5 cwt. P_2O_5 per acre, and potash manure salt at the rate of 1.0 cwt. K_2O per acre.
BEET SOWN : May 19th.
BEET LIFTED : November 3rd-4th.
PREVIOUS CROP : Beans.
CULTIVATIONS :

Ordinary : Sufficient hand or light horse hoeing to keep down weeds. Actual cultivations : June 20th, July 7th, horse hoe. July 9th, 13th, 14th, 15th, hand hoe. Intensive : Ordinary cultivation, plus an intensive cultivation with horse or motor implements as nearly as possible at ten-day intervals from singling. Actual additional cultivations : July 14th, 22nd, August 2nd, motor hoe. August 13th, 27th with small motor cultivator.

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SUMMARY OF RESULTS

		No Nitrogen	Nitrogen 3 weeks before sowing	Nitrogen at sowing	½ N. at sowing ½ N. at singling	*Mean of Nitrogens*	*Mean*
ROOTS (Washed) Tons per acre							
Ordinary cultivation	Early basal ..	13.97	14.21	13.84	14.22	*14.09*	*14.06*
	Late basal ..	12.95	14.04	14.44	14.17	*14.22*	*13.90*
	Mean	*13,46*	*14.12*	*14.14*	*14.19*	*14.15*	*13.98*
Intensive inter-drill cultivation	Early basal ..	11.64	12.96	13.44	13.06	*13.16*	*12.78*
	Late basal ..	12.22	13.48	13.93	12.88	*13.43*	*13.13*
	Mean	*11.93*	*13.22*	*13.68*	*12.96*	*13.29*	*12.95*
Mean of both cultivations		*12.70*	*13.67*	*13.92*	*13.58*	*13.72*	*13.47*
Per Cent.							
Ordinary cultivation	Early basal ..	103.7	105.5	102.8	105.6	*104.6*	*104.4*
	Late basal ..	96.2	104.2	107.3	105.2	*105.6*	*103.2*
	Mean	*100.0*	*104.9*	*105.0*	*105.4*	*105.1*	*103.8*
Intensive inter-drill cultivation	Early basal ..	86.4	96.3	99.8	97.0	*97.7*	*94.9*
	Late basal ..	90.7	100.1	103.4	95.6	*99.7*	*97.5*
	Mean	*88.6*	*98.2*	*101.6*	*96.3*	*98.7*	*96.2*
Mean of both cultivations		*94.3*	*101.5*	*103.3*	*100.8*	*101.9*	*100.0*
TOPS Tons per acre							
Ordinary cultivation	Early basal ..	14.07	17.53	16.41	15.90	*16.61*	*15.98*
	Late basal ..	12.92	17.82	17.07	15.19	*16.70*	*15.75*
	Mean	*13.50*	*17.68*	*16.74*	*15.54*	*16.66*	*15.86*
Intensive inter-drill cultivation	Early basal ..	10.68	14.13	13.78	13.16	*13.69*	*12.94*
	Late basal ..	11.96	13.90	14.88	13.95	*14.24*	*13.67*
	Mean	*11.32*	*14.02*	*14.33*	*13.56*	*13.97*	*13.30*
Mean of both cultivations		*12.41*	*15.85*	*15.53*	*14.55*	*15.31*	*14.58*
Per Cent.							
Ordinary cultivation	Early basal ..	96.5	120.2	112.5	109.1	*113.9*	*109.6*
	Late basal ..	88.6	122.2	117.0	104.2	*114.5*	*108.0*
	Mean	*92.6*	*121.2*	*114.8*	*106.6*	*114.2*	*108.8*
Intensive inter-drill cultivation	Early basal ..	73.2	96.9	94.4	90.2	*93.8*	*88.7*
	Late basal ..	82.0	95.3	102.0	95.7	*97.7*	*93.8*
	Mean	*77.6*	*96.1*	*98.2*	*92.9*	*95.8*	*91.2*
Mean of both cultivations		*85.1*	*108.6*	*106.5*	*99.8*	*105.0*	*100.0*

Standard errors of single entries—Roots : 0.276 tons, or 2.05 per cent.
Tops : 0.693 tons, or 4.75 per cent.

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SUGAR PERCENTAGE

		No Nitrogen	Nitrogen 3 weeks before sowing	Nitrogen at sowing	½ N at sowing ½ N at singling	*Mean of Nitrogens*	*Mean*
Ordinary cultivation	Early basal ..	18.84	18.34	18.35	18.72	*18.47*	*18.56*
	Late basal ..	18.98	18.60	18.46	18.84	*18.63*	*18.72*
	Mean	*18.91*	*18.47*	*18.40*	*18.78*	*18.55*	*18.64*
Intensive inter-drill cultivation	Early basal ..	18.92	18.50	18.65	18.54	*18.56*	*18.65*
	Late basal ..	18.75	18.46	18.48	18.37	*18.44*	*18.52*
	Mean	*18.84*	*18.48*	*18.56*	*18.46*	*18.50*	*18.58*
Mean of both cultivations		*18.88*	*18.48*	*18.48*	*18.62*	*18.52*	*18.61*
Per Cent.							
Ordinary cultivation	Early basal ..	101.2	98.5	98.6	100.6	*99.2*	*99.7*
	Late basal ..	102.0	99.9	99.2	101.2	*100.1*	*100.6*
	Mean	*101.6*	*99.2*	*98.9*	*100.9*	*99.7*	*100.2*
Intensive inter-drill cultivation	Early basal ..	101.6	99.4	100.2	99.6	*99.7*	*100.2*
	Late basal ..	100.7	99.2	99.3	98.7	*99.1*	*99.5*
	Mean	*101.2*	*99.3*	*99.8*	*99.2*	*99.4*	*99.8*
Mean of both cultivations		*101.4*	*99.2*	*99.3*	*100.0*	*99.5*	*100.0*

Standard error of single entry: 0.168 or 0.903 per cent.

CONCLUSIONS

Significantly greater yield with ordinary cultivation, both for roots(1.03 tons or 7.6 per cent.) and tops (2.56 tons or 17.6 per cent.). The difference in sugar percentage is small and not significant, being 0.06 or 0.4 per cent. greater for ordinary cultivation.

Significant response to nitrogen both for roots and tops, set off by a significant reduction in sugar percentage, this response (to 0.6 cwt. N per acre) being at the rate of 1.70 tons per acre, or 12.7 per cent. per cwt. N for the roots, with a corresponding reduction of 0.60 or 3.2 per cent. in sugar percentage. In the case of the tops the response to nitrogen given half at singling is significantly less than when given at or before sowing. The similar difference in the roots is not large enough to be significant.

No significant differences between early and late applications of the basal manures, though the individual treatment means are somewhat more irregular than expectation.

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KALE

EFFECT OF AMMONIUM HUMATE, SULPHATE OF AMMONIA AND HUMIC ACID.

RK—Great Harpenden, 1932

Plan and yields in lb.—green weights.

1				5
4 738	**1** 560	**5** 580	**2** 601	**3** 616
5 750	**2** 573	**3** 659	**4** 595	**1** 448
1 733	**4** 603	**2** 605	**3** 699	**5** 446
3 762	**5** 601	**4** 585	**1** 532	**2** 486
2 822	**3** 719	**1** 551	**5** 521	**4** 565
21				25

W ↑

SYSTEM OF REPLICATION : 5 × 5 Latin square.
AREA OF EACH PLOT : 1/50th acre. (10 yds × 9 yds 2 ft.) Kale drilled in rows spaced 18 inches apart, not thinned.
VARIETY : Thousand Head.
TREATMENTS :
1=No nitrogen.
2=Sulph. Amm. at the rate of 0.145 cwt. N per acre.
3=Sulph. Amm. } at the rate of
4=Ammonium humate } 0.4 cwt. N per
5=Humic acid } acre.
MANURES APPLIED : June 14th.
BASAL DRESSING : Super. at the rate of 0.5 cwt. P_2O_5 per acre, and 30 per cent. potash manure salt at the rate of 1.0 cwt. K_2O per acre.
SEED SOWN : June 10th.
KALE CUT : November 19th.
PREVIOUS CROP : Rye, fed off by sheep.

SUMMARY OF RESULTS

	No Nitrogen	S/Amm. 0.145cwt. N.	S/Amm. 0.4 cwt. N.	Amm. Hum. 0.4 cwt. N.	Humic Acid 0.4 cwt. N.	*Mean*	Standard Error
Fresh Material—							
Tons per acre	12.61	13.78	15.42	13.78	12.94	*13.70*	0.382
Per cent.	92.0	100.6	112.5	100.5	94.4	*100.0*	2.78
*Percentage of Dry Matter in Fresh**	14.88	15.30	14.17	15.22	15.00	*14.91*	—

* Replicates bulked.

CONCLUSIONS

Significant response of fresh material to nitrogen. The yield with ammonium humate is the same as with the small dressing of sulphate of ammonia, and significantly less than with the large dressing of sulphate of ammonia. The yield with humid acid is not significantly different from that with no nitrogen, but neither is its difference from that with ammonium humate fully significant.

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KALE

VARIATION IN TIME OF CUTTING

RK—Great Harpenden, 1932

Plan and yields in lb.—Green Weights.

	I	II	III	IV	V	
74	3 661	4 672	1 683	5 696	2 721	70
	1 609	5 674	2 720	4 654	3 750	N ↑
	5 508	2 649	4 725	3 780	1 799	
	2 578	3 761	5 695	1 674	4 690	
54	4 513	1 663	3 720	2 709	5 650	50

SYSTEM OF REPLICATION : 5 × 5 Latin square.

AREA OF EACH PLOT IN COLUMN I, 0.0095 acres (28 × 34 links); II, 0.0118 acres (28 × 42 links); III, IV, V, 0.0126 acres (28 × 45 links).

VARIETY : Marrow stem kale.

CUTTINGS :
1=Cut November 21st.
2=Cut December 20th.
3=Cut January 16th.
4=Cut February 13th.
5=Cut March 13th.

BASAL MANURING : 16 tons dung, 2 cwt. sulphate of ammonia, 3 cwt. superphosphate, and 3 cwt. potash manure salt per acre.

SEED SOWN : May 6th.

PREVIOUS CROP : Spring oats.

SUMMARY OF RESULTS

	Cut on Nov. 21st	Cut on Dec. 20th	Cut on Jan. 16th	Cut on Feb. 13th	Cut on Mar. 13th	*Mean*	Standard Error
Fresh material—							
Tons per acre	25.68	25.30	27.50	24.37	24.14 †	*25.40*	0.643
Leaf stem ratio	0.455*	0.425	0.495	0.347	0.302	*0.405*	0.0396

* Replicates bulked.

† Including 2.92 tons dead leaves (determined by sampling).

For percentage dry matter, and percentage nitrogen and fibre in dry matter, see p. 28. These percentages were determined on bulked replicates.

CONCLUSIONS

The significantly greater yield of fresh material in the third cutting is due to the wet condition of the crop at this harvesting. The leaf-stem ratio shows a significant reduction with the later cuttings, the high value of the third cutting being also due to the wet condition of the leaves. The yields of total dry matter, total nitrogen, and total fibre are given on p. 28.

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KALE

EFFECT OF THINNING
ORDINARY AND INTENSIVE CULTIVATION
RK—Great Harpenden, 1932

Plan and yields in lb., green weights (excluding edge rows).

26	UO	649	TI	844	38
	TI	525	UI	830	
	TO	605	TO	854	
	UI	605	UO	952	
	TO	627	TI	771	
	UI	639	UO	909	
	TI	598	UI	852	
	UO	701	TO	840	
	TI	608	TI	761	
	UI	646	TO	850	
	UO	672	UI	862	
37	TO	600	UO	923	49

N ↑

SYSTEM OF REPLICATION : 6 randomised blocks of 4 plots each.
AREA, EXCLUDING EDGE ROWS : 3/200 acre (165 × 9.06 links). Five rows in each plot. Edge rows harvested separately. 30 feet discarded from plots 26-37.
VARIETY : Marrow stem.
TREATMENTS :
U = Unthinned. (In 2 ft. rows).
T = Thinned (18 ins.).
O = Ordinary cultivation. (June 2nd-4th, horse hoe.)
I = Intensive cultivation. (July 4th, 19th, 27th, motor hoe.)
BASAL MANURING : Dung at the rate of 16 tons per acre, sulphate of ammonia at the rate of 2 cwt. per acre, superphosphate and potash manure salt at the rate of 3 cwt. per acre.
SEED SOWN : May 6th.
KALE CUT : November 14th and 18th.
PREVIOUS CROP : Spring oats, under-sown with seeds fed off by sheep.

YIELDS OF GREEN MATERIAL (EDGE ROWS EXCLUDED)

	Tons per acre.			Per cent.		
	Unthinned.	Thinned.	*Mean.*	Unthinned.	Thinned.	*Mean.*
Ordinary cultivation	27.65	25.18	*26.42*	108.5	98.8	*103.6*
Intensive cultivation	25.51	23.63	*24.57*	100.1	92.7	*96.4*
Mean	*26.58*	*24.40*	*25.50*	*104.3*	*95.7*	*100.0*

Standard Error of single entry: 0.323 tons or 1.27 per cent.
Standard Error per plot: 0.790 tons or 3.10 per cent. (edge rows discarded).
0.896 tons or 3.52 per cent. (edge rows included).
The discarding of the edge rows has significantly reduced the error.

ANALYSIS OF SAMPLES

	Ordinary cultivation, Unthinned.	Ordinary cultivation, Thinned.	Intensive cultivation, Unthinned.	Intensive cultivation, Thinned.
Ratio Leaf/stem (green material)	0.430	0.603	0.415	0.579
Percentage dry matter* : Leaves (green) ..	13.6	12.3	12.8	12.3
Stems (green) ..	14.4	13.6	14.3	13.7

* Replicates bulked.

CONCLUSIONS

Thinning and intensive cultivation both reduce the yield of green material significantly.

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