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# Details of the Classical and Long-term Experiments Up to 1962



Full Table of Content

# **Park Grass- Hay**

## **Rothamsted Research**

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## HAY, THE PARK GRASS PLOTS, 1856 ONWARDS

The Park has probably been in grass for some centuries. There is no record of any seed having been sown. The herbage has been cut for hay each year since manurial treatments were first applied in 1856. The management of the aftermath following the first hay cut in each season varied in the early years of the experiment. It was grazed by sheep in the years 1856 to 1872 except for 1866 and 1870. In 1866, 1870, 1873, 1874, 1876, 1884, 1885, 1887 the aftermath was mown but not removed from the plots. In all other years the produce of the second and sometimes third cut has been carted and weighed either as hay or green.

Table 11
Manures applied per acre, 1856 onwards unless otherwise stated.
Treatment

Plot	D	P P <sub>2</sub> 0 <sub>5</sub> lb. (2)	K K <sub>2</sub> 01b.	Na lb. (4)	Mg lb.		N N lb. (1)	N N 1b.	F cwt.	Notes
1	-	-	Trum I	-	-	-	43(N <sub>1</sub> )	h P F	-	(5)
2	-	-	-	-		-	8 4 Pr	-	-	(6)
3	-	-	-	-	-	- 2	hr i	-	-	
4-1	-	65	-	-	-	9 5	-	23 -	1-0	(19)
4-2	-	65	-	-	-	-	86(N <sub>2</sub> )	-	_	(19)
5-1	-	-	-	9-1	-	-	- 4	-	-	(7)
5-2	-	65	245	M_ 0		30 29	Ser Person	S 87 40	-	(7)
6	-	65	245	100	100	-	-	-	- 00	(8)(19)
7	-	65	245	100	100	-	- 54	16	11_11	
8	-	65	-	100	100	-21 -3			-	(9)(19)
9	-	65	245	100	100	_	86(N <sub>2</sub> )		-	
10	-	65	-	100	100	-	86(N <sub>2</sub> )		-	(9)
11-1	-	65	245	100	100	-	129(N <sub>3</sub> )		- 12	(10)(19)
11-2	-	65	245	100	100	400	•		-	(10)(11)
12	-	-	-	_	2	er Deel	an Limon	8.		
)	14	-	- 4	ž -	-	-	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	S. T.	-)	
13	-	-	_	-	_		1 82 17 A	41.32	6 )	(12)
14	-	65	245	100	100	-	- 10	86(N2	)-	(13)
15	-	65	245	100	100	TI LE	me andy		-200	(14)
16	-	65	245	100	100	8 -	100 .191	43(N <sub>1</sub>	) -	(15)
17	-	-	-	-	_	4 _5	M - 2	43(N1		(15)
18	-	-	245	100	100	- Tag	86(N2)		and F	(16)
19	14		- 41	-	-	_	100	9.974	ABB L	(17)
20)	14	- 33	49		-	-		- 26(N	- ) )- )	(18)
D1 - 4		_				4			, ,	

Plot areas: For manuring mostly 0.5 acre and 0.25 acre, a few 0.17 and 0.12 acre. Most plots are divided into halves to test lime.

Treatments: D: farmyard manure, P: superphosphate, K: sulphate of potash, Na: sulphate of soda, Mg: sulphate of magnesia, Si: silicate of soda, N: sulphate of ammonia, N: nitrate of soda, F: fish guano.

#### Notes:

- (1) Until 1916 the ammonia nitrogen was supplied as a mixture of equal parts of ammonium sulphate and ammonium chloride. Since 1917 only ammonium sulphate was used.
- (2) Until 1888 the phosphate was made from 200 lb. bone ash and 100 lb. sulphuric acid per acre, then superphosphate. 1897-1902 basic slag.
- (3) Until 1878 the standard dressing of sulphate of potash was 1471b. K<sub>2</sub>0 per acre, it was then raised to 245 lb. K<sub>2</sub>0.
- (4) Until 1863 plots 7, 9, 11-1, 11-2, 13, 14, 16 had 200 lb. sulphate of soda.
- (5) Until 1863 14 tons dung also.
- (6) Until 1863 14 tons dung only.
- (7) After ammonium salts 86 lb. N until 1897.
- (8) After ammonium salts 86 lb. N until 1868.
- (9) Since 1862 147 lb. K<sub>2</sub>0 as sulphate of potash; 200 lb. sulphate of soda; 100 lb. sulphate of magnesia; 65 lb. P<sub>2</sub>0<sub>5</sub>. From 1864-1904 the dressing of sulphate of soda was 250 lb. (500 lb. 1862-1863).
- (10) Until 1881 the ammonium salts were applied at 172 lb. N except in 1859-1861 when the dose was 86 lb.
- (11) The silicate dressing began when plot 11 was divided in 1862 and from 1862-1870 equal parts of calcium and sodium silicate were used.
- (12) Until 1897 complete fertiliser as plot 9 with 2000lb, per acre of cut wheat straw in addition. From 1898-1904 as plot 9, no straw. The dung has been applied once every 4 years starting 1905 and the fish meal once every 4 years starting 1907. Since 1959 the fish meal dressing has been standardised at 0.5cwt. N per acre (approximately 6cwt. meal).
- (13) Since 1858.
- (14) Since 1876, Nitrate of soda 86 lb. N 1858-1875.
- (15) Since 1858.
- (16) Since 1905. From 1865-1904 P, K, Na, Mg, Si, and N equal to the amounts contained in 1 ton of hay.
- (17) Every 4th year since 1905. From 1872-1904 65 lb. P<sub>2</sub>0<sub>5</sub>;142 lb. K<sub>2</sub>0; and 43 lb. N as nitrate of soda.
- (18) Dung every 4th year since 1905, fertilisers inintervening years. From 1872-1904 superphosphate 65lb. P<sub>2</sub>0<sub>5</sub> and potassium nitrate, supplying approximately 43lb. N and 142lb. K<sub>2</sub>0.
- (19) Sawdust at 18cwt. per acre was applied to plots 6, 8, 10 until 1862, and on plot 4 until 1858.

Liming: The first liming was done in 1881, when a strip 11 yards wide on the North side of plots 1-13 received 27cwt. chalk per acre. In 1883-1884 the plots were halved, one half having 18cwt. burnt lime per acre. In 1887-1888 the other halves of the plots were similarly treated. Plots 11-1 and 11-2 received a double dose on these occasions. In 1903 a regular liming scheme was started on the South halves of plots 1 to 4-2, 7 to 11-2, 13, 16. The dressing was 2000 lb. ground lime per acre every 4 years (missing 1911). In 1920 plots 14, 15, and 17 came into this scheme, all dressings being increased by one quarter to allow for the extra year, and plots 18,

Limed Not Limed Li	The tree of the color of the co					ia	Dry matter; cwt per acre	atter; cwt per 8-year Means	r acre					
The first crop crop crop crop crop crop crop crop	The first crop crop crop crop crop crop crop crop		toN	1920	- 27	per	Not	1928	- 35	ped	- N	Limed	36 - 43	ped
Crop 13.6 20.9 15.7 21.3 11.7 15.7 15.1 18.4 6.1 10.6 12.4 13.0 13.6 12.4 13.0 11.3 14.6 11.6 14.3 7.3 13.0 16.8 14.4 13.0 17.7 11.8 15.8 13.2 13.6 17.1 10.9 12.8 9.4 12.7 21.3 13.0 17.7 11.8 15.8 13.8 17.1 10.9 12.8 9.4 12.7 21.5 15.5 18.6 24.4 31.9 14.6 17.5 27.3 31.7 10.6 15.7 21.5 15.1 12.0 12.0 20.2 24.4 31.9 14.6 17.5 27.3 31.7 10.6 15.7 21.5 15.1 20.0 28.2 24.4 31.9 14.6 17.5 27.3 31.7 10.6 15.7 21.5 15.1 15.1 15.2 12.9 20.0 28.2 24.3 31.2 20.0 28.2 24.3 31.2 20.0 28.2 24.3 31.2 20.0 28.2 24.3 31.2 20.0 28.2 24.3 31.2 20.0 28.2 24.3 31.2 20.0 28.2 24.3 31.2 20.0 28.2 24.3 31.2 20.0 28.2 24.3 31.2 20.0 28.2 24.3 31.2 20.0 20.2 28.2 24.3 31.2 20.0 28.2 24.3 31.2 20.0 28.2 24.3 31.2 20.0 20.2 20.0 28.2 24.3 31.2 20.0 20.2 20.0 20.2 20.0 20.0 20.0 2	Crop 13.6 20.9 16.7 21.3 11.7 15.7 15.1 18.4 6 11.8 4 10.8 12.4 10.3 15.2 15.5 12.8 17.3 11.7 15.7 12.1 16.2 11.3 14.6 11.8 4 11.8 15.8 12.8 12.8 12.8 12.8 12.8 12.8 12.8 12	Treatment	18t	Total	181	Total	18t	Total	18t	Total	181	Total	lst	Tota
13.6 20.9   15.7 21.3   11.7 15.7   15.1   18.4   6.1   10.8   12.4     10.3 15.7   12.1   16.2   11.3   14.6   11.6   14.3   7.3   10.6   8.4     13.0 17.7   11.8   15.8   13.8   17.1   10.9   12.8   6.5   9.2   7.9     15.5 19.6   24.4   31.9   14.6   17.5   27.3   31.7   10.6   15.7     15.1 20.9	13.6   20.9   15.7   21.3   11.7   15.7   18.4   6.1   10.8   12.4     10.3   15.7   12.1   16.2   11.3   14.6   11.6   14.3   7.3   10.6   8.4     13.0   17.7   11.8   15.8   17.1   10.9   12.8   8.4   12.7     15.1   20.9	Symbols	crop		crop		crop	1	crop		crop		crop	
10.3   15.7   12.1   16.2   11.3   14.6   11.6   14.3   7.3   10.6   8.4     13.0   17.7   11.8   15.8   17.1   10.9   12.8   8.4   12.7   8.9     13.0   17.7   11.8   15.8   17.1   10.9   12.8   8.4   12.7   8.9     15.1   20.1   28.0     10.5   12.4     12.8   18.3   18.3     15.1   20.1   28.0     20.5   26.0     18.8   25.3     15.1   20.1   28.0     20.5   26.0     18.8   18.3     15.2   20.2   28.2   24.3   31.2   21.8   27.7   27.8   34.6   19.3   28.3     15.4   10.4   11.3   16.2   15.3   19.9   12.1   16.2   12.8   17.3     15.2   20.5   28.2   24.3   31.2   21.8   27.7   27.8   34.6   19.3   28.3     15.4   20.4   24.3   31.2   21.8   27.7   27.8   34.6   14.6   25.3     15.4   20.4   24.3   31.2   21.8   27.7   27.8   34.6   14.6   27.5     15.8   29.7   29.8   38.6   21.2   26.0   32.5   38.6   14.6   27.5     15.8   29.7   29.8   38.6   20.2   27.1   27.8   27.8     15.8   29.7   29.8   39.8   20.8   20.8     15.8   29.7   29.8   39.8   20.8   34.0   47.8   25.2   39.9     16.4   27.5   34.9   26.7   33.6   34.0   47.8   36.6   45.9   36.6     16.4   22.4   18.4   24.1   16.4   20.5   20.0   23.0   12.9   17.8     16.4   22.4   18.4   24.1   16.4   20.5   20.0   23.0   12.9   17.8     16.4   22.4   17.8   22.8   36.6   17.6   23.8   34.7   26.9   34.4   23.7      16.4   20.6   28.4   17.8   23.8   20.9   20.6   23.8     16.5   23.9   34.0   20.4   23.5   20.0   23.0      16.5   23.4   31.7   20.5   23.8   34.8   23.8   20.8      16.5   23.4   31.7   20.8   23.8   20.8   23.8   20.8      16.5   23.4   31.7   20.8   20.8   20.8   20.8   20.8      16.5   20.7   20.8   20.8   20.8   20.8   20.8   20.8      16.5   20.7   20.8   20.8   20.8   20.8   20.8      16.5   20.8   20.8   20.8   20.8   20.8   20.8      16.5   20.8   20.8   20.8   20.8   20.8      16.5   20.8   20.8   20.8   20.8      16.5   20.8   20.8   20.8   20.8      16.5   20.8   20.8   20.8      16.5   20.8   20.8   20.8      16.5   20.8   20.8   20.8      16.5   20.8   20.8   20.8      16.5   20.8   20.8      16.5	10,3   15,7   12,1   16,2   11,3   14,6   11,6   14,3   7,3   10,6   8,4     13,0   17,7   11,8   15,8   17,1   10,9   12,8   8,4   13,7     15,1   20,1   28,0       15,5   19,9     12,8   13,1     15,1   20,1   28,0       20,5   26,0     18,6   25,3     15,1   20,2   28,2   24,3   31,2   21,8   27,7   27,8   34,6   19,3   28,3     13,4   19,4   11,3   16,2   15,3   19,9   12,1   16,2   12,8   17,1     15,1   20,0   28,2   24,3   31,2   21,8   27,7   27,8   34,6   19,3   28,3     13,4   19,4   11,3   16,2   15,3   19,9   12,1   16,2   12,8   17,9     15,1   20,6   29,8   38,6   21,2   26,0   32,5   38,6   14,6   21,6   27,1     15,1   20,8   38,6   21,2   26,0   32,5   38,6   14,6   21,6   27,1     15,1   20,2   20,4   31,7   20,4   31,4   37,8   32,9   39,9     15,2   27,5   34,9   26,7   33,6   31,1   37,1   26,7   31,4   25,4   32,0     16,4   22,4   18,5   25,1   21,2   27,1   21,4   25,3   14,1   19,6   19,9     16,2   27,2   25,8   36,6   17,6   23,8   32,7   31,4   31,4   31,4     16,4   22,4   17,9   22,4   31,7   26,0   23,0   12,9   17,9     16,4   22,4   17,9   22,4   31,7   26,7   31,4   25,4   32,1     16,4   22,4   17,9   22,2   21,4   25,5   19,8   27,3   14,1   19,6     16,2   27,2   25,8   36,6   17,6   23,8   32,7   31,4   31,4   31,4   31,4     16,4   22,4   17,9   22,4   31,7   26,0   23,0   12,9   17,9   16,3     16,4   22,4   17,9   22,9   21,4   28,2   18,4   34,2   26,9   34,2   26,0     18,4   24,9   24,1   24,9   21,4   23,5   26,9   34,2   26,9   34,2     18,4   24,9   24,9   24,9   24,9   24,9   24,1   24,4   36,0   26,0   34,4   36,0     18,4   24,9   24,9   24,9   24,9   24,4   36,0   26,0   34,2   26,0   34,2   26,0     18,4   24,9   24,9   24,9   24,9   24,2   26,0   24,2   26,0   24,2   26,0   24,2   26,0     18,4   24,9   24,9   24,9   24,4   24,9   24,2   26,0   24,2   26,0   24,4   26,0   24,4   26,0   24,4   26,0   24,4   26,0   26,0   26,0   26,0   26,0   26,0   26,0   26,0   26,0   26,0   26,0   26,0   26,0   26,0   26,0   26,0   26,0   26,0   26,0   26	N <sub>1</sub>	13,6	20.9	15.7	21.3	11.7	15.7	15, 1	18.4	6.1		12.4	16.2
13.0   17.7   11.8   15.8   17.1   10.9   12.8   9.4   12.7   8.9     13.0   17.7   11.8   15.8   17.1   10.9   12.8   9.4   12.7   8.9     15.5   19.6   24.4   31.9   14.6   17.5   27.3   31.7   10.6   15.7   21.5     15.1   20.9	13.0 17.7 11.8 15.8 17.1 10.9 12.8 8.4 12.7 8.9 11.8 15.8 17.1 10.9 12.8 8.4 12.7 8.9 11.8 15.8 17.1 10.9 12.8 8.4 12.7 8.9 11.5 12.0 17.7 11.8 15.8 17.1 10.9 12.8 8.4 12.7 10.6 15.7 21.5 15.1 20.9 20.1 20.9 2 24.3 31.2 21.8 27.7 27.8 34.6 19.3 28.3 24.3 17.1 10.8 15.8 17.1 10.9 12.8 18.3 28.3 24.3 11.2 10.5 10.4 12.1 16.2 10.8 10.3 28.3 24.3 11.2 10.5 10.4 12.1 16.2 12.8 17.1 10.8 12.8 17.1 10.6 10.5 10.5 10.5 10.5 10.5 10.5 10.5 10.5	0	10,3	15.7	12.1	16.2	11.3	14.6	11.6	14.3	7.3	10.6	8.4	11.1
13.0   17.7   11.8   15.8   13.8   17.1   10.9   12.8   8.4   12.7   21.5     8.6   12.1     9.4   12.4     12.8   17.1   10.9   12.8   8.5       15.1   20.9     15.5   10.9     12.8   18.3       15.1   20.0   28.2   24.3   31.2   21.8   27.7   27.8   34.6   20.1   28.0   28.2   24.3   24.3     13.4   19.4   11.3   11.2   22.8   22.9   45.0   22.3   26.2   36.2   39.3     13.4   19.4   11.3   12.2   22.8   22.9   45.0   22.9   40.0   38.1     14.4   45.4   43.4   55.4   35.2   47.6   47.1   55.8   22.9   40.0   38.1     11.5   15.7     11.2   14.8     8.4   13.1       11.5   15.7     11.2   14.8     8.4   13.1       11.5   15.7     11.2   14.8   37.8   32.3   34.1   39.4     14.4   22.4   18.5   25.1   21.2   25.0   22.9   36.7   30.7   48.7     15.4   22.7   22.5   35.8   34.0   41.8   47.9   36.6   45.9   34.7     16.4   22.4   18.5   25.1   21.2   27.1   21.4   25.3   14.1   19.6   19.9     16.4   22.4   18.5   25.1   21.2   27.1   21.4   25.3   14.1   19.6   19.9     16.5   27.2   25.8   36.6   17.6   23.8   32.3   43.7   40.3   16.9     16.5   27.2   25.8   36.6   17.6   23.8   32.3   34.1   25.7   30.4   36.6     16.5   27.2   25.8   36.4   37.1   26.7   31.4   25.4   25.9     16.5   27.2   25.8   36.4   37.1   26.7   31.4   25.4   25.9     16.5   27.2   25.8   36.4   31.7   26.7   31.4   25.4   25.9     16.5   27.2   25.8   36.4   31.7   26.7   31.4   25.4   25.9     16.5   27.2   25.8   36.6   17.6   20.5   20.0   20.0   20.9     16.5   27.2   25.8   36.4   27.3   36.4   25.3     16.5   27.5   27.5   27.5   27.4   27.5   27.5   27.5   27.5     27.6   28.4   17.9   23.9   27.4   27.5   27.5   27.5   27.5     28.4   34.2   34.3   34.4   27.3   36.4   27.3   36.4   27.3   36.4     29.6   28.4   17.9   23.9   20.4   20.5   20.5   20.5   20.5   20.5   20.5   20.5   20.5   20.5   20.5   20.5   20.5   20.5   20.5   20.5   20.5   20.5   20.5   20.5   20.5   20.5   20.5   20.5   20.5   20.5   20.5   20.5   20.5   20.5   20.5   20.5   20.5   20.5   20.5   20.5	13.0   17.7   11.8   15.8   13.8   17.1   10.9   12.8   8.4   12.7   21.5     8.6   12.1     9.4   12.4     15.5   19.6   15.7   21.5     15.1   20.9     15.5   19.8     12.8   18.3       15.1   20.0   28.2   24.3   31.2   21.8   27.7   27.8   34.6   20.1     15.1   20.0   28.2   24.3   31.2   21.8   27.7   27.8   34.6   24.3     13.4   19.4   11.3   11.5   15.2   15.2   26.0   32.5   38.6   14.6   21.6   27.1     18.1   20.1   28.6   20.8   38.6   21.2   26.0   32.5   38.6   14.6   21.6   27.1     18.1   20.1   28.0   21.2   26.0   32.5   38.6   14.6   21.6   27.1     18.2   20.2   35.6   38.7   47.6   47.1   55.8   22.9   40.0   38.1     18.3   20.4   49.5   35.8   34.0   47.8   59.7   30.7   48.7     19.4   49.5   39.9   43.0   42.7   47.8   59.7   30.7   48.7     19.4   22.4   18.5   25.1   21.2   27.1   21.4   25.3   14.1   19.6   19.9     19.4   22.4   18.4   23.4   24.4   25.3   14.1   19.8   27.3   18.2*     19.4   20.6   28.4   17.9*   23.9*   21.4   28.5   31.3   24.3     19.5   27.7   27.8   39.0   21.4   25.5   31.4   25.4   25.0     19.4   20.6   28.4   17.9*   23.9*   21.4   28.5   20.0   23.0     19.4   20.6   28.4   17.9*   23.9*   21.4   28.5   20.5   20.5     19.4   20.6   28.4   17.9*   23.9*   21.4   28.5   20.5   20.5     19.4   20.7   31.7   20.5   20.5   20.5   20.5   20.5     19.4   20.7   31.7   20.7   31.4   20.5   20.5     19.4   20.7   31.7   20.7   31.4   31.4   31.4     20.6   28.4   17.9*   23.9*   21.4   28.5   20.5   20.5     20.6   28.4   17.9*   23.9*   21.4   28.5   20.5   20.5   20.5     20.6   28.4   17.9*   23.9*   21.4   28.5   20.5   20.5   20.5     20.6   28.4   17.9*   23.9*   21.4   28.5   20.5   20.5   20.5     20.6   28.4   17.9*   23.9*   21.4   28.5   20.5   20.5   20.5     20.6   28.4   17.9*   23.9*   21.4   28.5   20.5   20.5   20.5   20.5     20.6   28.4   17.9*   23.9*   21.4   28.5   20.5   20.5   20.5   20.5   20.5   20.5   20.5   20.5   20.5     20.6   28.4   24.4   24.4   24.5   24.5   24.5   24.5     20.6   28.4   24.5   24.5   24.5	0	8.8	12.8	9.6	13.2	9.7	12.4	9.6	11.8	6.5	8.2	4.8	10.6
15.5 19.6 24.4 31.9 14.6 17.5 27.3 31.7 10.6 15.7 21.5 18.6 12.1 20.9 15.5 19.9 12.8 18.3 15.5 19.9 12.8 18.3 15.5 19.9 1.0 12.8 18.3 1.0 12.0 1.0 12.0 1.0 12.0 1.0 12.0 1.0 12.0 1.0 12.0 1.0 12.0 1.0 12.0 1.0 12.0 1.0 12.0 1.0 12.0 1.0 12.0 1.0 12.0 1.0 12.0 1.0 12.0 1.0 12.0 1.0 12.0 1.0 12.0 1.0 12.0 1.0 12.0 1.0 12.0 1.0 12.0 1.0 12.0 1.0 12.0 1.0 12.0 1.0 12.0 1.0 12.0 1.0 12.0 1.0 12.0 1.0 12.0 1.0 12.0 1.0 12.0 1.0 12.0 1.0 12.0 1.0 12.0 1.0 12.0 1.0 12.0 1.0 12.0 1.0 12.0 1.0 12.0 1.0 12.0 1.0 12.0 1.0 12.0 1.0 12.0 1.0 12.0 1.0 12.0 1.0 12.0 1.0 12.0 1.0 12.0 1.0 12.0 1.0 12.0 1.0 12.0 1.0 12.0 1.0 12.0 1.0 12.0 1.0 12.0 1.0 12.0 1.0 12.0 1.0 12.0 1.0 12.0 1.0 12.0 1.0 12.0 1.0 12.0 1.0 12.0 1.0 12.0 1.0 12.0 1.0 12.0 1.0 12.0 1.0 12.0 1.0 12.0 1.0 12.0 1.0 12.0 1.0 12.0 1.0 12.0 1.0 12.0 1.0 12.0 1.0 12.0 1.0 12.0 1.0 12.0 1.0 12.0 1.0 12.0 1.0 12.0 1.0 12.0 1.0 12.0 1.0 12.0 1.0 12.0 1.0 12.0 1.0 12.0 1.0 12.0 1.0 12.0 1.0 12.0 1.0 12.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1	15.5   19.6   24.4   31.9   14.6   17.5   27.3   31.7   10.6   15.7   21.5     15.1   20.9     15.5   19.9     12.8   18.3       15.1   20.9     20.5   26.0     18.6   18.3   24.3     15.1   20.0   28.2   21.3   31.2   21.8   27.7   27.8   34.6   19.3   28.3     15.1   20.0   28.2   21.3   31.2   21.8   27.7   27.8   34.6   19.3   28.3     15.1   20.0   28.2   21.3   21.2   26.0   22.3   26.2   36.2   37.3     15.1   20.6   28.6   38.6   21.2   26.0   32.5   38.6   14.6   21.6   27.1     15.1   20.1   28.0   38.6   27.2   26.0   32.5   38.6   14.6   21.6   27.1     15.1   20.2   25.8   38.6   27.2   26.0   32.5   38.6   14.6   21.6   27.1     11.5   15.7     11.2   14.8     84.1   31.1     11.5   15.7     11.2   14.8     84.1   31.1     11.5   15.7     11.2   14.8     84.1   31.1     11.5   15.7     11.2   14.8     84.1   31.1     11.5   15.7     11.2   14.8     84.1   31.1     11.5   15.7     11.2   14.8     84.1   31.1     11.5   15.7   39.6   43.0   42.7   52.1   47.8   59.7   30.7   48.7     10.4   27.5   34.9   25.1   27.2   27.1   27.4   25.3   47.1   19.6   19.9     10.4   27.5   34.9   27.5   35.8   32.3   34.1   25.1   27.3   18.3     10.5   20.6   28.4   17.9   23.9   20.5   20.0   22.1   24.1   25.1   25.1     10.5   20.5   20.5   20.0   23.4   23.7   25.0     10.5   20.5   20.5   20.5   20.0   22.1   25.1   25.1     10.5   20.5   20.5   20.5   20.5   20.5   20.5     10.5   20.5   20.5   20.5   20.5   20.5   20.5   20.5     10.5   20.5   20.5   20.5   20.5   20.5   20.5     10.5   20.5   20.5   20.5   20.5   20.5   20.5     10.5   20.5   20.5   20.5   20.5   20.5   20.5     10.5   20.5   20.5   20.5   20.5   20.5   20.5     10.5   20.5   20.5   20.5   20.5   20.5   20.5     10.5   20.5   20.5   20.5   20.5   20.5   20.5     10.5   20.5   20.5   20.5   20.5   20.5   20.5     10.5   20.5   20.5   20.5   20.5   20.5   20.5     10.5   20.5   20.5   20.5   20.5   20.5   20.5     10.5   20.5   20.5   20.5   20.5   20.5     10.5   20.5	ь	13.0	17.7	11.8	15.8	13.8	17.1	10.9	12.8	9.4	12.7	8.8	11.7
15.1 20.9     15.5 19.9     12.8 18.3       15.1 20.9     15.5 19.9     12.8 18.3       15.1 20.9     20.5 26.0     18.6 25.5       18.2 20.1 28.0     20.5 26.0     18.6 25.5       18.2 20.0 28.2 24.3 31.2 21.8 27.7 27.8 34.6   10.3 28.3 24.3   13.4 19.4 11.3 16.2 15.3 19.9 12.1 16.2 12.8 17.9 10.5   INAMG	15.1 20.9     15.5 19.9     12.8 18.3       15.1 20.9     15.5 19.9     12.8 18.3       15.1 20.9     20.5 26.0   -   18.6 25.5   -     18.2 20.1 28.0     20.5 26.0   -   18.6 25.5   -     18.2 20.0 28.2 24.3 31.2 21.8 27.7 27.8 34.6   10.3 28.3 24.3   13.4 19.4 11.3 16.2 15.3 19.9 12.1 16.2 12.8 17.9 10.5   Iname	N2P	15.5	19.6	24.4	31.9	14.6	17.5	27.3	31.7	10.6	15.	21.5	26.2
15.1 20.9 15.5 19.9 18.6 25.5 18.6 25.5 18.6 25.5 18.6 25.5 18.6 25.5 18.6 25.5 18.6 25.5 18.6 25.5 18.6 25.5 18.6 25.5 18.6 25.5 18.6 20.0 28.2 24.3 31.2 21.8 27.7 27.8 34.6 19.3 28.3 24.3 24.3 26.2 35.6 38.7 48.6 32.9 39.9 45.0 52.3 26.2 36.2 36.2 35.3 24.3 26.2 35.6 29.8 38.6 21.2 26.0 32.5 38.6 14.6 21.6 27.1 10.8 21.6 27.1 11.5 15.7 11.2 14.8 47.1 55.8 22.9 40.0 38.1 11.5 15.7 11.2 14.8 47.1 55.8 22.9 40.0 38.1 11.5 15.7 11.2 14.8 47.9 30.7 48.7 40.3 30.6 39.5 43.0 42.7 52.1 41.8 47.9 36.6 45.9 34.7 18.5 25.1 21.2 27.1 21.4 25.3 14.1 19.6 19.9 34.7 16.3 18.2*  INM 27.5 34.9 26.7 33.6 31.1 37.1 26.7 31.4 25.3 14.1 19.6 19.9 34.7 16.3 18.2*  INM 27.5 34.9 26.7 33.6 31.1 37.1 26.7 31.4 25.3 19.1 13.8 18.2*  INM 27.5 34.9 26.7 33.6 31.1 37.1 26.7 31.4 25.4 32.0 25.6 25.6 25.0 20.0 23.0 12.9 17.3 15.9 18.2*  INM 27.5 34.9 26.7 33.6 31.1 37.1 26.7 31.4 25.3 14.1 19.6 19.9 25.6 25.0 25.0 25.0 25.0 25.0 25.0 25.0 25.0	Ing 20.1 28.0 15.5 18.9 18.6 25.5 18.6 25.5   18.8	0	8.6	12.1	,		9.4	12.4			6.3	9.5	•	
LING  20.1 28.0	LING  20.0 28.2 24.3 31.2 21.8 27.7 27.8 34.6 19.3 28.3 24.3  44  13.4 19.4 11.3 16.2 15.3 19.9 12.1 16.2 12.8 17.9 10.5  LNAMG  26.2 35.6 38.7 48.6 32.9 39.9 45.0 52.3 26.2 36.2 36.3  LNAMG  19.7 26.6 29.8 38.6 21.2 26.0 32.5 38.6 14.6 21.6 27.1  LNAMGSI  19.7 26.6 29.8 38.6 21.2 26.0 32.5 38.6 14.6 21.6 27.1  LNAMGSI  19.7 26.8 34.4 15.7 2 47.6 47.1 55.8 22.9 40.0 38.1  LNAMGSI  10.5 39.5 47.6 47.1 55.8 22.9 40.0 38.1  LNAMG  20.6 39.5 27.5 35.8 34.0 42.7 52.1 41.8 47.9 36.45.9 34.7  LS. 30.6 39.5 27.5 35.8 34.0 42.7 52.1 41.8 47.9 38.6 45.9 34.7  LS. 30.6 39.5 27.2 25.8 36.6 17.6 23.8 38.7 7 7.9 16.3 18.2*  LNAMG  20.6 28.4 17.9 23.9* 21.4 28.2 18.7 25.7 11.9 17.3 15.9  LNAMG  20.6 28.4 17.9 23.9* 21.4 28.2 18.7 25.7 11.9 17.3 15.9  LNAMG  20.6 28.4 17.9 23.9* 21.4 28.2 18.7 25.7 11.9 17.3 15.9  LNAMG  20.7 48.7 49.7 17.6 23.8 38.7* 7.9 16.3 18.2*  LNAMG  20.8 20.7 31.4 28.2 18.7 25.5 19.8 27.3 18.6*  LNAMG  20.9 28.7 33.0* 31.6 38.0 28.8 34.2* 26.9 34.4 25.0 25.0  20.6 28.7 37.1 37.1 37.1 37.1 36.7 31.4 36.0 28.0 28.0 28.0 28.0 28.0 28.0 28.0 28	PK	15,1	8.02			15.5	19.8			12.8	18.3		•
4g 13.4 19.4 11.3 16.2 15.3 19.9 12.1 16.2 12.8 17.9 10.5 10.5 10.8 17.9 10.5 10.5 10.5 10.5 10.5 10.5 10.5 10.5	4g 13.4 19.4 11.3 16.2 15.3 19.9 12.1 16.2 12.8 17.9 10.5 10.5 10.8 17.9 10.5 10.5 10.5 10.5 10.5 10.5 10.5 10.5	PKNaMg	20, 1	28.0	,		20.5	26.0			18.6	25.5		
fig. 13.4 19.4 11.3 16.2 15.3 19.9 12.1 16.2 12.8 17.9 10.5 famg 26.2 35.6 39.7 48.6 32.9 39.9 45.0 52.3 26.2 36.2 36.2 33.3 famg 19.7 26.6 29.8 38.6 21.2 26.0 32.5 38.6 14.6 21.6 27.1 in.	fig. 13.4 19.4 11.3 16.2 15.3 19.9 12.1 16.2 12.8 17.9 10.5 famg 26.2 35.6 38.7 48.6 32.9 39.9 45.0 52.3 26.2 36.2 36.2 33.3 famg 19.7 26.6 29.8 38.6 21.2 26.0 32.5 38.6 14.6 21.6 27.1 in.	PKNaMg	20.0	28.3	24.3	31.2	21.8	27.7	27.8	34.6	19.3		24.3	31.8
tamg 16.2 35.6 38.7 48.6 32.9 39.9 45.0 52.3 26.2 36.2 35.3 13.3 14.45.4 45.4 43.4 55.4 35.2 26.0 32.5 38.6 14.6 21.6 27.1 1.8 13.1 45.4 45.4 43.4 55.4 35.2 47.6 47.1 55.8 22.9 40.0 38.1 11.5 15.7 - 11.2 14.8 47.9 59.7 30.7 48.7 40.3 11.5 15.7 - 11.2 14.8 47.9 59.7 30.7 48.7 40.3 11.5 15.7 - 11.2 14.8 47.9 36.6 45.9 34.7 18.8 22.4 49.5 35.9 43.0 42.7 52.1 41.8 47.9 36.6 45.9 34.7 18.8 23.7 18.5 25.1 21.2 27.1 21.4 25.3 14.1 19.6 19.9 17.3 15.9 16.3 18.2*  INM 27.5 34.9 26.7 33.6 31.1 37.1 26.7 31.4 25.3 14.1 19.6 19.9 17.3 15.9 16.3 18.2*  INM 27.5 34.9 26.7 33.6 31.1 37.1 26.7 31.4 25.3 14.1 19.6 19.9 17.3 15.9 17.3 15.9 18.2 27.2 25.8* 36.6* 17.6 23.8 32.3* 38.7* 7.9 16.3 18.2*  INM 27.5 34.9 41.2 27.2 25.8* 36.6* 17.6 23.8 32.3* 38.7* 7.9 16.3 18.2*  INM 27.5 34.9 41.3 17.9 23.9* 21.4 28.2 18.7* 23.5* 19.8 27.3 18.6*  INM 27.5 34.9 41.3 17.9 23.9* 21.4 28.2 18.7* 23.5* 19.8 27.3 18.6*  INM 27.5 34.9 41.3 1.1 4 28.2 18.7* 23.5* 19.8 27.3 18.6*  INM 27.5 34.9 41.3 31.6 38.0 28.8* 34.2* 26.9 34.4 23.7*  INM 27.5 34.9 41.3 37.1 4 36.7 4 36.0 4 36.0 4 36.0 5 37.4*  INM 27.5 34.9 41.3 37.1 4 36.0 4 36.0 5 30.0 5 30.0 5 30.0 5 30.0 5 50.0 5 50.0 5 50.0 5 50.0 5 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0	tamg 16.2 35.6 38.7 48.6 32.9 39.9 45.0 52.3 26.2 36.2 35.3 13.3 14.45.4 45.4 43.4 55.4 35.2 26.0 32.5 38.6 14.6 21.6 27.1 1.8 47.1 55.8 22.9 40.0 38.1 1.8 47.1 55.8 22.9 40.0 38.1 1.5 15.7 - 11.2 14.8 47.9 59.7 30.7 48.7 40.3 1.1 51.5 15.7 - 11.2 14.8 47.9 59.7 30.7 48.7 40.3 1.1 51.5 15.7 - 11.2 14.8 47.9 36.6 45.9 34.7 18.8 22.9 4.0 18.8 13.1 - 8.4 13.1 1 - 8.4 13.1 1 - 11.2 14.8 47.9 36.6 45.9 34.7 18.9 18.2 18.1 18.2 18.1 18.2 18.1 18.2 18.2	PNaMg	13,4	19.4	11.3	16.2	15,3	19.9	12.1	16.2	12.8		10.5	14.6
Inamg 19.7 26.6 29.8 38.6 21.2 26.0 32.5 38.6 14.6 21.6 27.1 Inamg 13.4 45.4 45.4 45.4 45.4 55.4 40.0 53.7 47.1 55.8 22.9 40.0 38.1 Inamg 13.5 15.7 1 11.2 14.8 59.7 30.7 48.7 40.3 1namg 13.5 15.7 1 11.2 14.8 14.1 37.8 29.7 30.7 48.7 40.3 1namg 13.5 27.5 35.8 34.0 41.8 11.4 37.8 25.2 35.9 20.8 1namg 13.4 49.5 35.9 43.0 42.7 52.1 41.8 47.9 36.6 45.9 34.7 1namg 16.2 27.2 25.8 36.6 43.0 12.9 17.3 15.9 18.3 18.2*	Inamg 19.7 26.6 29.8 38.6 21.2 26.0 32.5 38.6 14.6 21.6 27.1 Inamg 13.4 45.4 45.4 45.4 45.4 55.4 40.0 53.7 47.1 55.8 22.9 40.0 38.1 inamg 13.4 45.4 45.4 45.4 45.2 47.6 47.1 55.8 22.9 40.0 38.1 inamg 13.5 15.7 1 11.2 14.8 1 11.8 13.1 1 11.5 15.7 1 11.2 14.8 1 11.8 13.1 1 11.8 13.1 1 11.8 13.1 1 11.8 13.1 1 11.8 13.1 1 11.8 13.1 1 11.8 13.1 1 11.8 13.1 1 11.8 13.1 1 11.8 13.1 1 11.8 13.1 1 11.8 13.1 1 11.8 13.1 1 11.8 13.1 1 11.8 13.1 1 11.8 13.1 1 11.8 13.1 1 11.8 13.1 1 11.8 13.1 1 11.8 13.1 1 11.8 13.1 1 11.8 13.1 1 11.8 13.1 1 11.8 13.1 1 11.8 1 11.8 13.1 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.8 1 11.	N2 PKNaMg	26.2	35,6	38.7	48.6	32.9	39.9	45.0	52.3	26.2	36.2	33, 3	41.8
CNAMES S1.4 45.4 45.4 45.4 45.2 47.6 47.1 55.8 22.9 40.0 38.1 1.5 15.7 11.2 14.8 59.7 30.7 48.7 40.3 30.7 48.7 40.3 30.6 39.5 27.5 35.8 34.0 41.8 37.8 25.2 35.9 20.8 30.7 48.7 40.3 30.6 39.5 27.5 35.8 34.0 41.8 37.8 25.2 35.9 20.8 30.7 48.7 30.7 48.7 40.3 30.6 39.5 27.5 35.8 34.0 41.8 37.8 25.2 35.9 20.8 34.7 49.5 35.9 43.0 42.7 52.1 41.8 47.9 36.6 45.9 34.7 18.9 18.3 11.3 37.1 26.7 31.4 25.3 14.1 19.6 19.9 34.7 16.4 22.1 27.1 21.4 25.3 14.1 19.6 19.9 18.3 16.3 16.3 18.2 16.4 24.1 16.4 20.5 20.0 23.0 12.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 17.3 15.9 1	11.5   15.7     11.2   14.8   59.7   30.7 48.7   40.3     11.5   15.7     11.2   14.8   -	N2 PNaMg	19.7	26.6	29.8	38.6	21.2	26.0	32.5	38.6	14.6	21.6	27.1	34.0
11.5   15.7     -   11.2   14.8   59.7   30.7 48.7   40.3   30.6   39.5   27.5   35.8   34.0   41.8   37.8   25.2   35.9   20.8   39.4   49.5   35.9   43.0   42.7   52.1   41.8   47.9   36.6   45.9   34.7   40.3   42.8   49.5   31.4   37.8   25.2   35.9   20.8   39.4   49.5   35.9   43.0   42.7   52.1   41.8   47.9   36.6   45.9   34.7   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8	11.5   15.7     -   11.2   14.8   59.7   30.7 48.7   40.3   30.6   39.5   27.5   35.8   34.0   41.8   37.8   25.2   35.9   20.8   39.4   49.5   35.9   43.0   42.7   52.1   41.8   47.9   36.6   45.9   34.7   40.3   39.4   49.5   35.9   43.0   42.7   52.1   41.8   47.9   36.6   45.9   34.7   40.8   39.4   49.5   35.9   43.0   42.7   52.1   41.8   47.9   36.6   45.9   34.7   41.8   47.9   36.6   45.9   34.7   40.8   39.4   49.5   39.4   49.5   39.4   49.5   39.6   45.9   34.7   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8   40.8	N3PKNaMg	31.4	45.4	43.4	55.4	35.2	47.6	47.1	55.8	22.8	40.0	38.1	50.6
11.5   15.7     11.2   14.8     8.4   13.1       30.6   39.5   27.5   35.8   34.0   41.8   31.4   37.8   25.2   35.9   20.8     39.4   49.5   35.9   43.0   42.7   52.1   41.8   47.9   36.6   45.9   34.7     1Mg   21.8   29.7   18.5   25.1   21.2   27.1   21.4   25.3   14.1   19.6   19.9     16.4   22.4   18.4   24.1   16.4   20.5   20.0   23.0   12.9   17.3   15.9     16.4   22.4   18.4   24.1   16.4   20.5   20.0   23.0   12.9   17.3   18.2**     18.4   24.9   23.0   21.4   23.2   20.4   31.3   20.5   25.5     18.4   24.9   23.0   20.5   20.5   20.5   20.9   24.4   23.7     18.4   24.9   25.7   33.0   28.8   34.2   26.9   34.4   23.7     26.3   34.9   1.3   1.4   36.0   28.8   34.2   26.9   34.4   23.7     27.5   29.7   37.1   20.5   20.5   20.5   25.5     28.5   29.7   37.1   20.5   20.5   20.5   20.5     28.5   29.7   37.1   20.5   20.5   20.5   20.5     29.7   37.1   20.5   20.5   20.5   20.5     20.5   20.5   20.5   20.5   20.5     20.5   20.5   20.5   20.5     20.5   20.5   20.5   20.5     20.5   20.5   20.5     20.5   20.5   20.5     20.5   20.5   20.5     20.5   20.5   20.5     20.5   20.5   20.5     20.5   20.5   20.5     20.5   20.5   20.5     20.5   20.5     20.5   20.5     20.5   20.5     20.5   20.5     20.5   20.5     20.5   20.5     20.5   20.5     20.5   20.5     20.5   20.5     20.5   20.5     20.5   20.5     20.5   20.5     20.5   20.5     20.5   20.5     20.5   20.5     20.5   20.5     20.5   20.5     20.5   20.5     20.5   20.5     20.5   20.5     20.5   20.5     20.5   20.5     20.5   20.5     20.5   20.5     20.5   20.5     20.5   20.5     20.5   20.5     20.5   20.5     20.5   20.5     20.5   20.5     20.5   20.5     20.5   20.5     20.5   20.5     20.5   20.5     20.5   20.5     20.5   20.5     20.5   20.5     20.5   20.5     20.5   20.5     20.5   20.5     20.5   20.5     20.5   20.5     20.5   20.5     20.5   20.5     20.5   20.5     20.5   20.5     20.5   20.5     20.5   20.5     20.5   20.5     20.5   20.5     20.5   20.5     20.5   20.5     20.5   20.5     20.5   20.	11.5   15.7     11.2   14.8     8.4   13.1       30.6   39.5   27.5   35.8   34.0   41.8   31.4   37.8   25.2   35.9   20.8     39.4   49.5   35.9   43.0   42.7   52.1   41.8   47.9   36.6   45.9   34.7     Mg   21.8   29.7   18.5   25.1   21.2   27.1   21.4   25.3   14.1   19.6   19.9     16.4   22.4   18.4   24.1   16.4   20.5   20.0   23.0   12.9   17.3   15.9     16.5   27.2   25.8*   36.8*   17.6   23.8   32.3*   38.7*   7.9   16.3   18.2*     16.6   28.4   17.9*   23.9*   21.4   28.2   18.7*   23.5   19.8   27.3   18.6*     18.8   24.9   24.9   24.9   24.4   24.3   26.9   34.4   23.7*     18.8   24.9   25.7*   33.0*   31.6   38.0   28.8   34.2*   26.9   34.4   23.7*     26.3   34.9   1.3   1.3   1.3   1.3   1.3     29.7   37.1   1.3   1.3   1.3   1.3   1.3     25.0   29.7   37.1   2.3   38.0   28.8   34.2*   26.9   34.4   23.7*     25.0   28.1   28.2   28.3   28.3   28.3   28.3     27.1   28.2   28.3   28.3   28.3   28.3   28.3     28.2   28.3   28.3   28.3   28.3   28.3     28.3   28.3   28.3   28.3   28.3     28.3   28.3   28.3   28.3     28.3   28.3   28.3   28.3     28.3   28.3   28.3   28.3     28.3   28.3   28.3   28.3     28.3   28.3   28.3     28.3   28.3   28.3     28.3   28.3   28.3     28.3   28.3   28.3     28.3   28.3   28.3     28.3   28.3   28.3     28.3   28.3   28.3     28.3   28.3     28.3   28.3     28.3   28.3     28.3   28.3     28.3   28.3     28.3   28.3     28.3   28.3     28.3   28.3     28.3   28.3     28.3   28.3     28.3   28.3     28.3   28.3     28.3   28.3     28.3   28.3     28.3   28.3     28.3   28.3     28.3   28.3     28.3   28.3     28.3   28.3     28.3   28.3     28.3   28.3     28.3   28.3     28.3   28.3     28.3   28.3     28.3   28.3     28.3   28.3     28.3   28.3     28.3   28.3     28.3   28.3     28.3   28.3     28.3   28.3     28.3   28.3     28.4   28.3     28.3     28.3   28.3     28.3   28.3     28.3   28.3     28.3   28.3     28.3   28.3     28.3   28.3     28.3   28.3     28.3   28.3     28.3   28.3     28.3   28.3     28.3   28.3     28.	N <sub>3</sub> PKNaMgSi	38.7	50.8	44.1	57.2	40.0	53.7	47.8	28.7	30,7	48.7	40,3	55.8
10.6 39.5 27.5 35.8 34.0 41.8 31.4 37.8 25.2 35.9 20.8 39.4 49.5 35.9 43.0 42.7 52.1 41.8 47.9 36.6 45.9 34.7 18.5 25.1 21.2 27.1 21.4 25.3 14.1 19.6 19.9 34.7 18.5 25.1 21.2 27.1 21.4 25.3 14.1 19.6 19.9 34.7 16.4 22.4 18.4 24.1 16.4 20.5 20.0 23.0 12.9 17.3 15.9 16.3 18.2* 18.2* 17.8 29.4 31.7 1 16.4 20.5 20.0 23.0 12.9 17.3 15.9 18.2* 18.2* 17.8 23.0 4 17.9 23.9 4 17.9 23.9 4 17.9 23.9 4 17.9 23.9 4 17.9 23.0 4 17.9 23.0 4 17.9 23.0 4 17.9 23.0 4 17.9 20.5 20.5 20.5 20.5 20.5 20.5 20.5 20.5	10.6 39.5 27.5 35.8 34.0 41.8 31.4 37.8 25.2 35.9 20.8 39.4 49.5 35.9 43.0 42.7 52.1 41.8 47.9 36.6 45.9 34.7 18.5 25.1 21.2 27.1 21.4 25.3 14.1 19.6 19.9 34.7 18.5 25.1 21.2 27.1 21.4 25.3 14.1 19.6 19.9 34.7 16.4 22.4 18.4 24.1 16.4 20.5 20.0 23.0 12.9 17.3 15.9 18.2**  Inc. 4 22.4 18.4 24.1 16.4 20.5 20.0 23.0 12.9 17.3 15.9 18.2**  Inc. 4 22.4 18.4 24.1 16.4 20.5 20.0 23.0 12.9 17.3 15.9 18.2**  Inc. 4 22.4 17.9* 23.9**  Inc. 5 27.2 20.8 36.8 17.4 28.2 18.7**  Inc. 4 22.4 17.9**  Inc. 5 27.2 20.8 34.9 17.3 15.9 17.3 18.6**  Inc. 5 27.4 33.0**  Inc. 5 27.4 33.0**  Inc. 5 27.5 34.3 17.4 28.2 18.7**  Inc. 5 27.4 33.0**  Inc. 5 27.4 33.0**  Inc. 5 27.4 36.0**  Inc. 5 27.4 37.1 1	0	11.5	15.7	,		11.2	14.8			8.4	13.1	1	•
Mg 29.4 49.5 35.9 43.0 42.7 52.1 41.8 47.9 36.6 45.9 34.7 7 21.8 29.7 18.5 25.1 21.4 25.3 14.1 19.6 19.9 34.7 18.5 27.3 34.9 18.4 24.1 16.4 20.5 20.0 23.0 12.9 17.3 15.9 18.2 20.6 28.4 17.9 23.9 21.4 28.2 18.7 26.7 31.4 25.5 4 32.0 25.6 18.9 20.0 23.0 12.9 17.3 15.9 18.2 20.6 28.4 17.9 23.9 21.4 28.2 18.7 23.5 34.9 18.8 24.9 21.4 28.2 18.7 25.5 54 25.5 54 20.0 20.5 25.5 54 20.0 20.5 25.5 54 20.0 20.5 25.5 54 20.0 20.5 25.0 19.8 27.3 18.6 54 20.0 20.5 25.5 54 20.0 20.5 25.5 54 20.0 20.5 25.5 54 20.0 20.5 25.5 54 20.0 20.5 25.5 54 20.0 20.5 20.0 20.5 25.5 54 20.0 20.5 20.0 20.5 25.5 54 20.0 20.5 20.0 20.5 20.0 20.5 20.0 20.5 20.0 20.5 20.0 20.5 20.0 20.5 20.0 20.5 20.0 20.5 20.0 20.5 20.0 20.5 20.0 20.5 20.0 20.5 20.0 20.0	Mg 29.4 49.5 35.9 43.0 42.7 52.1 41.8 47.9 36.6 45.9 34.7 7 21.8 29.7 18.5 25.1 21.4 25.3 14.1 19.6 19.9 34.7 18.5 27.3 18.5 27.1 21.4 25.3 14.1 19.6 19.9 18.5 27.5 34.9 26.7 33.6 31.1 37.1 26.7 31.4 25.4 32.0 25.6 18.9 16.3 18.2*  16.4 22.4 18.4 24.1 16.4 20.5 20.0 23.0 12.9 17.3 15.9 16.3 18.2*  20.6 28.4 17.9* 23.9* 21.4 28.2 18.7* 23.5* 19.8 27.3 18.6* 18.8* 24.9† 20.5 20.5 20.5 25.5 5† 20.5 27.8 18.6* 28.3 34.9 (1.25.7* 33.0* 31.6 38.0 28.8* 34.2* 26.9 34.4 23.7* 25.0* 26.3 34.9 (1.25.7* 37.1* 26.3 34.9 26.0* 27.8 36.0* 28.8* 34.2* 26.9 34.4 23.7* 25.0* 28.8* 34.2* 26.9 34.4 23.7* 25.0* 28.8* 34.2* 26.9 34.4 23.7* 25.0* 28.8* 34.2* 26.9 34.4 23.7* 25.0* 28.8* 24.4 23.7* 25.0* 28.8* 24.4 23.7* 25.0* 28.8* 24.4 23.7* 25.0* 28.8* 24.4 23.7* 25.0* 28.8* 24.4 23.7* 25.0* 28.8* 26.0* 28.8* 28.0* 28.8* 28.0* 28.8* 28.0* 28.8* 28.0* 28.8* 28.0* 28.8* 28.0* 28.8* 28.0* 28.8* 28.0* 28.0* 28.8* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0* 28.0	D; F	30,6	39, 5	27.5	35.8	34.0	41.8	31.4	37.8	25.2	35.8	20.8	28.6
21.8 29.7 18.5 25.1 21.2 27.1 21.4 25.3 14.1 19.6 19.9 26.7 33.4 26.7 33.6 31.1 37.1 26.7 31.4 25.4 32.0 25.6 16.4 22.4 18.4 24.1 16.4 20.5 20.0 23.0 12.9 17.3 15.9 16.2 27.2 25.8 36.8 17.6 23.8 32.3* 38.7* 7.9 16.3 18.2* 20.6 28.4 17.9* 23.9* 21.4 28.2 18.7* 23.5* 19.8 27.3 18.6* 26.0* 31.9* 24.9* 21.4 28.2 18.7* 23.5* 19.8 27.3 18.6* 28.3 34.9 <sup>(1)</sup> 25.7* 33.0* 31.6 38.0 28.8* 34.2* 26.9 34.4 23.7* 29.7* 37.1* 4.9* 23.4* 36.0* 4.3 30.4* 36.0* 30.4* 36.0* 31.6 38.0 28.8* 34.2* 26.9 34.4 23.7* 25.0* 30.4* 36.0* 30.4* 36.0* 30.4* 36.0* 30.4* 36.0* 30.4* 36.0* 30.4* 36.0* 30.4* 36.0* 30.4* 36.0* 30.4* 36.0* 30.4* 36.0* 30.4* 36.0* 30.4* 36.0* 30.4* 36.0* 30.4* 36.0* 30.4* 36.0* 30.4* 36.0* 30.4* 36.0* 30.4* 36.0* 30.4* 36.0* 30.4* 36.0* 30.4* 36.0* 30.4* 36.0* 30.4* 36.0* 30.4* 36.0* 30.4* 36.0* 30.4* 36.0* 30.4* 36.0* 30.4* 36.0* 30.4* 36.0* 30.4* 36.0* 30.4* 36.0* 30.4* 36.0* 30.4* 36.0* 30.4* 36.0* 30.4* 36.0* 30.4* 36.0* 30.4* 36.0* 30.4* 36.0* 30.4* 36.0* 30.4* 36.0* 30.4* 36.0* 30.4* 36.0* 30.4* 36.0* 30.4* 36.0* 30.4* 36.0* 30.4* 36.0* 30.4* 36.0* 30.4* 36.0* 30.4* 36.0* 30.4* 36.0* 30.4* 36.0* 30.4* 36.0* 30.4* 36.0* 30.4* 36.0* 30.4* 36.0* 30.4* 36.0* 30.4* 36.0* 30.4* 36.0* 30.4* 36.0* 30.4* 36.0* 30.4* 36.0* 30.4* 36.0* 30.4* 36.0* 30.4* 36.0* 30.4* 36.0* 30.4* 36.0* 30.4* 36.0* 30.4* 36.0* 30.4* 36.0* 30.4* 36.0* 30.4* 36.0* 30.4* 36.0* 30.4* 36.0* 30.4* 36.0* 30.4* 36.0* 30.4* 36.0* 30.4* 36.0* 30.4* 36.0* 30.4* 36.0* 30.4* 36.0* 30.4* 36.0* 30.4* 36.0* 30.4* 36.0* 30.4* 36.0* 30.4* 36.0* 30.4* 36.0* 30.4* 36.0* 30.4* 36.0* 30.4* 36.0* 30.4* 36.0* 30.4* 36.0* 30.4* 36.0* 30.4* 36.0* 30.4* 36.0* 30.4* 36.0* 30.4* 36.0* 30.4* 30.0* 30.4* 30.0* 30.0* 30.0* 30.0* 30.0* 30.0* 30.0* 30.0* 30.0* 30.0* 30.0* 30.0* 30.0* 30.0* 30.0* 30.0* 30.0* 30.0* 30.0* 30.0* 30.0* 30.0* 30.0* 30.0* 30.0* 30.0* 30.0* 30.0* 30.0* 30.0* 30.0* 30.0* 30.0* 30.0* 30.0* 30.0* 30.0* 30.0* 30.0* 30.0* 30.0* 30.0* 30.0* 30.0* 30.0* 30.0* 30.0* 30.0* 30.0* 30.0* 30.0* 30.0* 30.0* 30.0* 30.0* 30.0* 30.0* 30.0* 30.0* 30.0* 30.0* 30.0* 3	21.8 29.7 18.5 25.1 21.2 27.1 21.4 25.3 14.1 19.6 19.9 26.7 33.4 25.4 32.0 25.6 16.4 20.6 23.0 23.0 12.9 17.3 15.9 16.2 27.2 25.8 36.8 17.6 23.8 32.3 38.7 7.9 16.3 18.2 20.6 28.4 17.9 23.9 21.4 28.2 18.7 25.5 19.8 27.3 18.6 26.0 33.9 17.9 23.9 21.4 28.2 18.7 25.5 19.8 27.3 18.6 26.0 34.9 17.9 23.9 31.6 38.0 28.8 34.2 2 26.9 34.4 23.7 2 29.7 37.1 18.8 7.1 1 20.5 20.5 20.5 20.5 20.5 20.5 20.5 20.5	N2PKNaMg	39.4	49.5	35.9	43.0	42.7	52. 1	41.8	47.9	36.6	45.8	34.7	41.7
Mg 27.5 34.9 26.7 33.6 31.1 37.1 26.7 31.4 25.4 32.0 25.6 16.4 22.4 18.4 24.1 16.4 20.5 20.0 23.0 12.9 17.3 15.9 16.3 16.2 27.2 25.8 36.6 17.6 23.8 32.3 38.7 7 7.9 16.3 18.2 20.6 28.4 17.9 23.9 21.4 28.2 18.7 20.5 4 31.3 4 18.8 24.9 4 17.9 23.9 21.4 28.2 18.7 20.5 25.5 19.8 27.3 18.6 20.5 26.3 34.9 12.5 7.4 31.6 38.0 28.8 34.2 2 26.9 34.4 23.7 2 29.7 37.1 4 21.2 20.5 20.5 20.5 25.0 3 20.7 37.1 20.7 37.1 20.7 30.4 36.0 4 36.0 34.8 20.7 25.0 4 23.7 2 20.7 37.1 20.7 30.4 36.0 4 36.0 34.8 20.7 25.0 4 25.0 4 20.7 20.7 20.7 20.7 20.7 20.7 20.7 20.7	Mg 27.5 34.9 26.7 33.6 31.1 37.1 26.7 31.4 25.4 32.0 25.6 16.4 22.4 18.4 24.1 16.4 20.5 20.0 23.0 12.9 17.3 15.9 16.2 25.2 25.8 36.6 17.6 23.8 32.3 38.7 7 7.9 16.3 18.2 20.6 28.4 17.9 23.9 21.4 28.2 18.7 20.5 20.5 28.4 31.3 1 18.8 24.9 1 18.8 24.9 1 20.5 20.5 28.8 34.2 2 20.5 28.8 34.2 2 20.5 28.8 34.2 2 20.5 28.8 34.2 2 20.5 28.8 34.2 2 20.5 28.8 34.2 2 20.5 28.8 34.2 2 20.5 28.8 34.2 2 20.5 28.8 34.2 2 20.5 28.8 34.2 2 20.5 28.8 34.2 2 20.5 28.8 34.2 2 20.5 28.8 34.2 2 20.5 28.8 34.2 2 20.5 28.8 27.3 18.6 2 20.5 28.8 27.3 18.6 2 20.5 28.8 27.3 18.6 2 20.5 28.8 27.3 18.6 2 20.5 28.8 27.3 18.6 2 20.5 28.8 27.3 18.6 2 20.5 28.8 27.3 18.6 2 20.5 28.8 27.3 18.6 2 20.5 28.8 27.3 28.9 28.8 27.3 18.5 2 20.5 28.8 27.3 28.9 28.8 27.3 28.9 28.8 27.3 28.9 28.8 27.3 28.9 28.8 27.3 28.9 28.8 27.3 28.9 28.8 27.3 28.9 28.8 27.3 28.9 28.8 27.3 28.9 28.8 27.3 28.9 28.8 27.3 28.9 28.8 27.3 28.9 28.9 28.9 28.9 28.9 28.9 28.9 28.9	PKNaMg	21.8	29.7	18.5	25.1	21.2	27.1	21.4	25.3	14.1	19.6	19.8	24.8
16.4 22.4 18.4 24.1 16.4 20.5 20.0 23.0 12.9 17.3 15.9 16.2 20.6 28.8 36.8 36.8 32.3 38.7 7.9 16.3 18.2 20.6 28.4 17.9 23.9 21.4 28.2 18.7 20.5 28.5 19.8 27.3 18.6 28.3 34.9 18.8 24.9 18.8 24.9 18.8 24.9 18.8 24.9 18.8 27.3 18.8 27.3 18.6 28.3 34.9 18.8 24.3 28.8 34.2 28.3 26.9 34.4 23.7 18.8 27.3 18.8 27.3 18.8 27.3 18.8 27.3 18.8 27.3 18.8 28.3 28.3 28.3 28.3 28.3 28.3 28.3 2	16.4 22.4 18.4 24.1 16.4 20.5 20.0 23.0 12.9 17.3 15.9 16.2 26.8 36.4 17.9 26.8 36.4 17.9 28.2 17.6 23.8 32.3 38.7 7 7.9 16.3 18.2 20.6 28.4 17.9 23.9 21.4 28.2 18.7 20.5 28.4 17.9 23.9 21.4 28.2 18.7 20.5 28.3 34.9 18.8 24.9 21.4 28.2 26.8 34.2 26.9 34.4 23.7 26.3 34.9 12.5 7 31.6 38.0 28.8 34.2 2 26.9 34.4 23.7 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	NIPKNaMg	27.5	34, 9	26.7	33,6	31.1	37.1	26.7	31.4	25.4	32.0	25.6	31.4
20.6 28.4 17.9* 23.9* 31.7* 26.0* 31.3* 38.7* 7.9 16.3 18.2* 20.6 28.4 17.9* 23.9* 21.4 28.2 18.7* 23.5* 19.8 27.3 18.6* 26.3 34.9 <sup>(1</sup> 25.7* 33.0* 31.6 38.0 28.8* 34.2* 26.9 34.4 23.7* 29.7* 37.1*	g 16.2 27.2 25.8* 36.* 17.6 23.8 32.3* 38.7* 7.9 16.3 18.2* 20.6 28.4 17.9* 23.9* 21.4 28.2 18.7* 23.5* 19.8 27.3 18.6* 26.3 34.9 <sup>(1</sup> 25.7* 33.0* 31.6 38.0 28.8* 34.2* 26.9 34.4 23.7*  * Heavy Liming + Light Liming (1) Excluding second crop 1925	N,	16.4	22.4	18.4	24.1	16.4	20,5	20.0	23.0	12.9	17.3	15.9	18.8
20.6 28.4 17.9* 23.9* 21.4 28.2 18.7* 23.5* 19.8 27.3 18.6* 26.3 34.9 <sup>(1</sup> 25.7* 33.0* 31.6 38.0 28.8* 34.2* 26.9 34.4 23.7* 25.0+ 4.8 2.7* 31.6 38.0 28.8* 34.2* 26.9 34.4 23.7* 4.8 2.7* 31.8 30.4* 36.0* 30.4* 36.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25.0* 25	20.6 28.4 17.9* 23.9* 21.4 28.2 18.7* 23.5* 19.8 27.3 18.6* 18.8* 24.9* 26.3 34.9 <sup>(1</sup> 25.7* 33.0* 31.6 38.0 28.8* 34.2* 26.9 34.4 23.7* 29.7* 37.1* 4 Eavy Liming + Light Liming (1) Excluding second crop 1925	N2KNaMg	16.2	27.2	25.8*	36.6*	17.6		32.3*	38.7*	7.8		18.2*	21.3
26.3 34.9 <sup>(1</sup> 25.7* 33.0*   21.4 28.2 18.7* 23.5*   19.8 27.3 18.6*   26.3 34.9 <sup>(1</sup> 25.7* 33.0*   31.6 38.0 28.8* 34.2*   26.9 34.4 23.7*   19.4 <sup>+</sup>   29.7 <sup>+</sup> 37.1 <sup>+</sup>   + Light Liming (1) Excluding second crop 1925	26.3 34.9 <sup>(1)</sup> 25.7* 33.0* 31.6 38.0 28.8* 34.2* 26.9 34.4 23.7* (19.4+ 37.1* 37.1* 30.4+ 36.0+ 30.4* 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 36.0+ 30.4+ 30.0+ 30.4+ 30.0+ 3				23.0+	31.7+			26.0+	31, 3+			16.9+	20.5
26.3 34.9 <sup>(1)</sup> 25.7* 33.0* 31.6 38.0 28.8* 34.2* 26.9 34.4 23.7*   29.7* 37.1*   30.4* 36.0*   4 Heavy Liming + Light Liming (1) Excluding second crop 1925	26.3 34.9 <sup>(1)</sup> 25.7* 33.0* 31.6 38.0 28.8* 34.2* 26.9 34.4 23.7* (1) 29.7* 37.1* + Light Liming (1) Excluding second crop 1925	D	20.6	28.4	17.9*	23.8*	21.4	28.3	18.7*	23.5*	19.8	27.	18.6*	24.5
26.3 34.9 <sup>(1</sup> 25.7* 33.0* 31.6 38.0 28.8* 34.2* 26.9 34.4 23.7* 29.7 <sup>+</sup> 37.1 <sup>+</sup> 39.7 <sup>+</sup> 30.4 <sup>+</sup> 36.0 <sup>+</sup> 30.4 <sup>+</sup> 36.0 <sup>+</sup> 25.0 <sup>+</sup> Heavy Liming + Light Liming (1) Excluding second crop 1925	26.3 34.9 <sup>(1)</sup> 25.7* 33.0* 31.6 38.0 28.8* 34.2* 26.9 34.4 23.7*   29.7 <sup>+</sup> 37.1 <sup>+</sup> + Heavy Liming + Light Liming (1) Excluding second crop 1925	The state of the			18.8+	24.8+		9	20.5+	25.5+			19.4+	26.0
30,4+ 36,0+ + Light Liming (1) Excluding second crop 1925	90,4+ 36,0+ + Light Liming (1) Excluding second crop 1925	D; N'PK	26.3	34.9(1	25.7*		31.6	38.0	28.8*	34.2*	26.9	34.	23.7*	29.8
+ Light Liming	+ Light Liming	111			29.7+			11-	30,4+	36.0+			25.0+	31.4
			* He	avy Limi	Bu		+ Ligh	t Limin		) Excludi	ng seco	nd crop	1925	

			8-ye	8-year Means	us	937					40	40-year Means	eans
		Not	Not Limed	1944 - 51	. 51 Limed	Not	Not Limed	1952 - 59	9 Limed	Not	Not Limed	1920 - 59 d   Limed	bem ed
Plot	Treatment Symbols	lst	Total	1st crop	Total	1st crop	Total	1st crop	Total	1st crop	Total	lst	Total
	N <sub>1</sub>	5.1	9.1	12.5	15.3	5.5	11.5	15.0	23,3	8.4	13.6	14.1	18.9
	0	8.7	11.8	9.3	12.0	9.5	15.5	12.7	20.5	9.4	13.6	10.8	14.8
	0	7.8	10.8	9.2	11.3	8.3	13.9	12.2	18.0	8.2	11.8	9.7	13.0
4-1	Д	11.5	14.6	11.6	15.4	14.9	23.2	15.3	24.1	12.5	17.1	11.7	15.9
4-2	N2P	8.5	11.3	20.3	24.2	10.2	17.9	24.4	32.9	11.9	16.4	23.6	29.4
5-1	0	4.9	6.5			6.7	11.9			7.2	10.5		
2-5	PK	11.0	15.9			17.5	27.1			14.4	20.4		•
	PKNaMg	20,3	29.0	,	,	23.5	35,5			20.6	28.8	•	
	PKNaMg	18.7	27.4	29.0	36.9	22.6	34, 1	29.5	41.8	20.5	29.5	27.0	35.3
	PNaMg	15.8	22.3	11.2	15.1	18.1	27.8	15.3	23.9	15.1	21.5	12.1	17.2
	N2PKNaMg	26.1	38.0	29.4	35.0	23.7	36.4	36.0	46.6	27.0	37.2	36.5	44.9
	N2PNaMg	14.9	22.9	23.4	28.5	13.7	23.8	29.0	37.7	16.8	24.2	28.4	35.5
11-1	N <sub>3</sub> PKNaMg	23.9	.42.7	40.1	49.5	21.9	45.0	40.8	56.5	27.1	44.2	41.9	53.6
11-2	N <sub>3</sub> PKNaMgSi	31.0	48.2	40.9	52.6	29.6	52.3	47.8	69.2	34.0	50.8	44.2	58.9
	0	9.0	13.2			10.6	18,3			10.1	15.0	•	
	D;F	21.8	30.0	26.0	33.6	27.3	40.9	25.8	40.1	27.7	37.6	26.3	35.2
	N2PKNaMg	34.2	44.7	32.8	39.7	39.1	55.2	39.2	53.7	38.4	49.5	36.9	45.2
	PKNaMg	14.7	22.0	18,5	22.6	18.6	27.6	28.8	42.4	18.1	25.2	21.4	28.0
	N1 PKNaMg	22.1	29.3	24.8	30.9	28.5	40.7	33.8	49.7	26.9	34.8	27.5	35.4
	N1	13,4	18.7	15.3	19.9	16.9	26.6	18.8	29.4	15.2	21.1	17.7	23.0
	N2KNaMg	7.9	13.2	19.8*	24.0*	8.7	17.4	20.6*	27.8*	11.7	19.6	23,3*	29.7*
			1000	17.7+	22.5+			20.2+	29, 1+	er.	a l	20.8+	27.0+
	D	20.6	28.3	20.5*	26.5*	24.8	36.9	23.5*	35.2*	21.4	29.8	19.9*	26.7*
			ł i c	22.2+	27.8+	Į,	31	25.8+	38.7+			21.4+	28.6+
	D; N1PK	26.8	34.2	28.4*	34.5*	29.3	42.4	30.2*	42.8*	28.2	36.8(1)27.4*	37.4*	34.8*
				28.3+	35.7+		1	28.8+	42.0+			28.4	36 4+

19, 20 were each divided into three sections one being left unlimed and the other two limed every 4 years:-

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Plot 18 61 and 35cwt. ground lime per acre.
19 28 and 5 " " " " " "
20 25 and 5 " " " " "
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In 1956 the lime used contained a high proportion of calcium carbonate and it was decided that in future the whole dressing should be applied as calcium carbonate equivalent to 2000 lb.CaO per acre.

Harvesting: For many years all operations were done by hand The mowing machine was first used for the first cut in 1901 though it had been used for the second cut since 1881. The first cut was made into hay and weighed as such until 1959; the second cut is weighed green and yields are calculated from the dry matter figures. In 1959 a flail type forage harvester was compared with the ordinary cutter-bar machine on the first cut on parts of plots 1, 7, 11-1, and 13. The tabulated yields for this crop refer to hay made in the usual way. The second cut on all plots in 1959 was estimated entirely by forage harvester, taking two cuts per plot except plots 5 to 10, 13, 18 which had four cuts. From 1960 yields of both cuts have been estimated from 2 or 4 cuts by the forage harvester; at the first cutting the remainder of each plot is cut by mower and made into hay on the plot but at the second cutting the whole produce is cut by forage harvester and carried green.

Further details of manuring: Memoranda of the Field Experiments, 1901, pp. 20-23.

Yields and botanical composition: Brenchley, W.E. The Park Grass plots at Rothamsted. Revised by K. Warington. Harpenden: Rothamsted Experimental Station. 1958. Brenchley, W.E.(1924). Manuring for hay. Rothamsted Monographs on Agricultural Science. London: Longmans, Green & Co.