Broadbalk Wheat Experiment Chalk Applications

ROTHAMSTED RESEARCH

DOI: 10.23637/rbk1-chalk-01

Cite as: Glendining, M.J, Gregory, A.S and Poulton, P.R. (2022) *Broadbalk Wheat Experiment Chalk Applications, Electronic Rothamsted Archive, Rothamsted Research, Harpenden, UK*. 10.23637/rbk1-chalk-01

Published by: Electronic Rothamsted Archive, Rothamsted Research, Harpenden, UK

Date: August 2022

Description: Details of the routine chalk (lime) applications (t ha^{-1} $CaCO_3$) to the Broadbalk Wheat Experiment, first applied in 1955. A regular scheme was introduced in 1956 and revised in 1976. The aim was to maintain soil pH above 7.5 and minimise the range of pH values within each section. No chalk was required 1993-2007. As in earlier years, differential chalk applications were made to selected plots in 2008, 2014 and 2019, the amount applied depending on the soil pH.

- **Page 1:** Cover Page
- **Page 2:** Table 1, chalk applications 1955-1975,
- **Page 3:** Table 2, chalk applications 1976-2022
- **Page 4:** Figures 1-3, detailed chalk applications in 2008, 2014 and 2019.

Site: R/BK/1. Broadbalk field, Rothamsted Experimental Farm, Rothamsted Research, West Common, Harpenden, Hertfordshire, AL5 2JQ, UK. Latitude 51.80946, Longitude -0.37301

Derived from:

- Rothamsted (1966) *Details of the Classical and Long-Term Experiments up to 1962*, Rothamsted Experimental Station, Lawes Agricultural Trust, Harpenden UK, (87pp) DOI: 10.23637/ERADOC-1-191
- Rothamsted Experimental Station (1970) *Details of the Classical and Long-Term Experiments up to 1967*, Rothamsted Experimental Station, Lawes Agricultural Trust, Harpenden UK, (128 pp) DOI: 10.23637/ERADOC-1-192
- Rothamsted (1977) *Details of the Classical and Long-Term Experiments 1968-1973*, Rothamsted Experimental Station, Lawes Agricultural Trust, Harpenden UK, (77pp) DOI: 10.23637/ERADOC-1-193
- Johnston, A. E. and Garner, H. V. (1969) Broadbalk: Historical Introduction, Rothamsted Experimental Station Report for 1968, Part 2, (12-25) DOI: 10.23637/ERADOC-1-34916
- Anon (1955), Field Experiments Section, Rothamsted Report For 1954, pp 143 – 156. DOI: 10.23637/ERADOC-1-76

Funding: Rothamsted Research receives strategic funding from the UK Biotechnology and Biological Sciences Research Council (BBSRC). The Rothamsted Long-term Experiments National Capability is supported by the BBSRC Grant BBS/E/C/000J0300 and the Lawes Agricultural Trust.

Table 1. Broadbalk Chalk applications, 1955-1975, t ha^{-1} $CaCO_3$

Harvest Year	Date of application	N1 Plot 6	N2 Plots 7, 10, 11, 12, 13, 14, 15 17 & 18 (alt), 20	N3 Plot 8	Castor meal Plot 19	All plots	Section*
1955	20-21/10/1954	0.69	1.38	2.07	0.69		Not to Section III.
1955	28/09/1954					12.56	Section Vb
1956	06/09/1955	0.34	0.69	1.03	0.34		Not to Section Ib
1957	29/09/1956	0.34	0.69	1.03	0.34		Not to Section II
1958	9-16/09/1957	0.34	0.69	1.03	0.34		Not to Sections Va, Vb
1959	22/09/1958	0.34	0.69	1.03	0.34		Not to Section IV
1960	04/09/1959	0.34	0.69	1.03	0.34		Not to Section III
1961	01/10/1960	0.34	0.69	1.03	0.34		Not to Section Ib
1962	07/09/1961	0.34	0.69	1.03	0.34		Not to Section II
1963	27/09/1962	0.34	0.69	1.03	0.34		Not to Section Va
1964	23/09-1/10/1963	0.34	0.69	1.03	0.34		Not to Section IV.
1964	19-23/09/1963				12.56	12.56	Section Va, and plot 19 Section IV
1965	09/09/1964	0.34	0.69	1.03	0.34		Not to Section III
1966	07/10/1965	0.34	0.69	1.03	0.34		Not to Section Ib
1967	21/09/1966	0.34	0.69	1.03	0.34		Not to Section II
1968	11/09/1967	0.34	0.69	1.03	0.34		Chalk to ALL new sections
1969							In addition; see below.
1970							
1971							
1972		No chalk applied					
1973							
1974							
1975							

* Chalk NOT applied to section in fallow that year (unless stated)

On plots receiving ammonium sulphate 100 lbs/acre of $CaCO_3$ was applied per 14 lbs/acre ammonium sulphate applied.
On the plot receiving castor meal 50 lbs/acre of $CaCO_3$ was applied per 14 lbs/acre castor meal applied
Note: double the subsequent yearly rate was applied for 1955

Additional chalk in 11/09/1967 (for revised sections/cropping/form of N in 1968 season) :-

	Plot					
	7	8	11	13	14	15
Section						
1		2.9				
6, 7		8.7	2.9	2.9		
8	2.9	2.9		2.9	2.9	2.9
9	2.9	2.9				

Table 2. Broadbalk Chalk applications, 1976-2022, t ha^{-1} $CaCO_3$

Harvest year	Date of applic.	Section									
		0	1	2	3	4	5	6	7	8	9
1976	29/9/75	-	3.1	3.1	3.1	-	-	-	-	-	-
1977	7/9/76	-	-	-	-	-	-	3.1	3.1	3.1	3.1
1978	19/9/77	2.9	-	-	-	2.9	2.9	-	-	-	-
1979	3/10/78	-	2.9	2.9	2.9	-	-	-	-	-	-
1980	19/9/79	-	-	-	-	-	-	2.9	2.9	2.9	2.9
1981	4/9/80	2.9	-	-	-	2.9	2.9	-	-	-	-
1982	12/9/81	-	2.9	2.9	2.9	-	-	-	-	-	-
1983	3/9/82	-	-	-	-	-	-	2.9	2.9	2.9	2.9
1984	31/8/83	2.9	-	-	-	2.9	2.9	-	-	-	-
1985	8/9/84	-	2.9	2.9	2.9	-	-	-	-	-	-
1986	19/9/85	-	-	-	-	-	-	2.9	2.9	2.9	2.9
1987	26/9/86	2.9	-	-	-	2.9	2.9	-	-	-	-
1988	-	( )*	-	-	-	-	( )*	-	-	-	-
1989	11/10/88	-	2.9	-	2.9	-	-	-	-	-	-
1990	13/9/89	-	-	2.9	-	-	-	-	-	2.9	-
1991	28/9/90	-	-	-	-	-	-	-	2.9	-	2.9
1992	9/10/91	-	-	-	-	2.9	-	2.9	-	-	-
1993	-	( )*	-	-	-	-	( )*	-	-	-	-
1994	-	-	( )*	-	( )*	-	-	-	-	-	-
1995	-	-	-	( )*	-	-	-	-	-	( )*	-
1996	-	-	-	-	-	-	-	-	( )*	-	( )*
1997	-	( )*	-	-	-	( )*	( )*	( )*	-	-	-
1998	-	-	( )*	-	( )*	-	-	-	-	-	-
1999	-	-	-	( )*	-	-	-	-	-	( )*	-
2000	-	-	-	-	-	-	-	-	-	-	-
2001	-	-	-	-	-	-	-	-	-	-	-
2002	-	-	-	-	-	-	-	-	-	-	-
2003	-	-	-	-	-	-	-	-	-	-	-
2004	-	-	-	-	-	-	-	-	-	-	-
2005	-	-	-	-	-	-	-	-	-	-	-
2006	-	-	-	-	-	-	-	-	-	-	-
2007	-	-	-	-	-	-	-	-	-	-	-
2008	05/10/2007	**See Figure 1**									
2009	-	-	-	-	-	-	-	-	-	-	-
2010	-	-	-	-	-	-	-	-	-	-	-
2011	-	-	-	-	-	-	-	-	-	-	-
2012	-	-	-	-	-	-	-	-	-	-	-
2013	-	-	-	-	-	-	-	-	-	-	-
2014	01/10/2013	**See Figure 2**									
2015	-	-	-	-	-	-	-	-	-	-	-
2016	-	-	-	-	-	-	-	-	-	-	-
2017	-	-	-	-	-	-	-	-	-	-	-
2018	-	-	-	-	-	-	-	-	-	-	-
2019	13/09/2018	**See Figure 3**									
2020	-	-	-	-	-	-	-	-	-	-	-
2021	-	-	-	-	-	-	-	-	-	-	-
2022	-	-	-	-	-	-	-	-	-	-	-
2022	-	-	-	-	-	-	-	-	-	-	-

( )* dressing omitted

Prior to 1976 chalk dressings were related to treatment and section. A uniform regular scheme was introduced in 1976 and revised in 1988. [Sections 0 and 5, which were due to receive chalk in 1988 under the revised scheme, had been limed the previous year; consequently the 1988 dressing was omitted]. Analysis of the 1987/88 soils showed that pH values were high and that the next cycle of dressings, due to start in 1993, could safely be withheld. Analysis of the 2000 soils showed that pH values were still high on most plots and that basal dressings were still not needed. However, there was an indication that values were starting to fall on selected treatments/plots; predominantly on those plots with little or no free calcium carbonate left in the surface soil (either because of position in field and/or previous high rates of ammonium sulphate). Therefore, it would be best if future dressings were once again related to specific plots. In 2008, 2014 and 2019 differential chalk applications were made to some strips/plots, but not all, in an attempt to eliminate pH differences between treatment strips.

Figure 1. Broadbalk Chalk applications, 2008, t ha^{-1} $CaCO_3$ Applied 05/10/2007

Section	0	1	2	3	4	5	6	7	8	9
Strip										
1			2							
2.1										
2.2										
3										
5										
6								4	2	
7		2					4	4	4	4
8	2	4	2			6	6		4	4
9								2		
10						6	4	4	2	4
11						2	4	6	4	4
12						4	2	4	4	2
13					2	4	2	6	6	4
14						2		6	6	6
15	4	6	6		2	4	4	6	6	6
16		2	2					2	2	2
17										
18										
19						4	2	6	2	4
20										

Figure 2. Broadbalk Chalk applications, 2014, t ha^{-1} $CaCO_3$ Applied 01/10/2013

Section	0	1	2	3	4	5	6	7	8	9
Strip										
1			4					2		
2.1										
2.2								2		
3										
5								2		
6							2	2	2	
7	2	2					2	4	2	2
8	4	2	4			2	2	4	4	2
9						2		4	2	
10						2	4	6	2	4
11						2	2	6	2	4
12						2	2	6	4	4
13						2	2	6	4	4
14						2	2	4	4	4
15	2	4	6	2		4	4	6	4	4
16			6					4	4	2
17			2					2	2	2
18										
19							2	4	4	2
20										

Figure 3. Broadbalk Chalk applications, 2019, t ha^{-1} $CaCO_3$ Applied 13/09/2018

Section	0	1	2	3	4	5	6	7	8	9
Strip										
1			2					2		
2.1	2									
2.2										
3										
5									2	
6							2	2	2	2
7	2		2			2	2	2	2	
8	2	2	2			2	2	4	4	4
9								2	2	2
10	2	2				2	4	2	4	2
11	2	2				2	4	2	4	4
12						2	2	2	4	4
13					2	2	2	2	2	2
14	2				2	2		2	2	2
15	4	2	2	2	2	2	2	2	4	4
16	2	4						4	2	2
17								2	2	2
18									2	2
19						4	2		4	2
20										