

Broadbalk Winter Wheat Experiment cropping 1843-2021

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Description: Cropping details for the Broadbalk Winter Wheat Experiment, 1843-2021, with details of crops grown, cultivars and rotations.

- **Pages 1-2:** Cover pages
- **Pages 3-4:** Broadbalk cropping 1843-1925, showing winter wheat cultivars, cropping and the various strip divisions. Also cropping 1839-1843 before the experiment was started.
- **Pages 5-6:** Broadbalk cropping 1926-1967, showing winter wheat cultivars, cropping and the different sections
- **Pages 7-8:** Broadbalk cropping 1968-2021, showing wheat cultivars, crop rotations and the different sections. 1st wheat in the rotations is clearly indicated. Also details of the cultivars of the other crops grown in the rotations (beans, potatoes, maize, oats). The layout groups the different sections to show continuous wheat and rotational sections, and development of the rotations.
- **Pages 9-10:** As for pages 7-8 except the layout is in actual section order.

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

Related Resources:

- Johnston, A.E. & Garner, H.V. (1969) *The Broadbalk Wheat Experiment 2. Historical Introduction*. Rothamsted Report for 1968, part 2, pp12-25. <https://doi.org/10.23637/ERADOC-1-34916>
- Rothamsted Research (2018) *Broadbalk experiment fertilizer and manure treatments, 1852-2021*, <https://doi.org/10.23637/rbk1-FertTreats>
- Glendining, M. J. and Poulton, P. R. (2018) *Broadbalk wheat experiment plan 1852-1925* <https://doi.org/10.23637/rbk1-sup-1534342858-01>
- Rothamsted Research (2017) *Broadbalk wheat experiment plan 1926-1967*. Electronic Rothamsted Archive, Rothamsted Research. <https://doi.org/10.23637/rbk1-plan1926-67-01>
- Rothamsted Research (2009) *Broadbalk experiment plan 1996-2017*. Electronic Rothamsted Archive, Rothamsted Research. <https://doi.org/10.23637/rbk1-plan1996-2017-01>
- Rothamsted Research (2018) *Broadbalk experiment plan revised 2018*. Electronic Rothamsted Archive, Rothamsted Research. <https://doi.org/10.23637/rbk1-today2018-01>

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Broadbalk Cropping 1843-1925

See 1852-1925 plan for more details:

[10.23637/rbk1-sup-1534342858-01](https://doi.org/10.23637/rbk1-sup-1534342858-01)

Wheat Cultivar	Year(s)	Cropping	Strip divisions
Old Red Lammas	1844	W	Strips were not divided
Old Red Lammas	1845	W	Strips were not divided except 5 into 5a and 5b
Old Red Lammas	1846-1848	W,W	1846-1851: Most strips divided into two field-length halves, North (a) and South (b) some receiving DIFFERENT fertilizer treatments
Old Red Cluster	1849-1851	W,W	
In 1852 the fertilizer treatments in most strips became established			
Old Red Cluster	1852	W,W	1852-1893: Most strips divided into two field-length halves, North (a) and South (b) receiving the SAME fertilizer treatments
Red Rostock	1853-1881	W,W	
Red Club	1882-1893	W,W	
1889, 1890: Each half was divided into West (T, Top) and East (B, Bottom), making four sub-plots. Wider row spacings were used in half of the plot to allow inter-row cultivation to control weeds.			
Red Club	1889	W,W	The T half was sown in 9 wide rows to allow inter-row cultivation. The B half was sown in the usual 18 rows at normal spacing.
Red Club	1890	W,W	The B half was sown in 9 wide rows to allow inter-row cultivation. The T half was sown in the usual 18 rows at normal spacing.
1894-1900: The a and b (North and South) halves were combined into one strip in 1894. Most strips were then divided West and East into Top (T, West) and Bottom (B, East) halves receiving the same fertilizer treatments. In 1894 paths were added between strips, making the cropped area smaller			
Red Club	1894-1899	W,W	
Squarehead's Master	1900	W,W	
Squarehead's Master	1901	W,W,W	The top half of the strip was harvested in two equal parts TT and TM. TM received N as bicarbonate of ammonia, instead of the usual ammonium sulphate, applied in spring. The B half was harvested as usual. Strips 6-8,10-14 and 18 only.
Squarehead's Master	1902	W	Strips were not divided, except strip 2 (a and b)
Squarehead's Master	1903	W	Strips were not divided, except strip 2 (a and b)
Squarehead's Master	1904	W,F	Most strips were divided into two, one half in wheat, the other half bare fallowed to control weeds
Giant Red	1905	F,W	Most strips were divided into two, one half bare fallowed to control weeds (cropped in 1904), the other in wheat (bare fallowed in 1904).
Squarehead's Master	1906-1909	W	1906-1911: Strips were not divided, except for strip 2 (a and b), and strip 11 in 1906 only (a and b)
Browick Red	1910	W	
Little Joss	1911	W	
1912-1925: All strips again divided into Top (T) and Bottom (B).			
Little Joss	1912	(W),W	B only harvested as there was very little crop on T due to weed infestation
Squarehead's Master	1913	W,W	Both T and B cropped as usual
Squarehead's Master	1914	F,W	T was bare fallowed to control weeds, B was cropped
Squarehead's Master	1915	W,F	T was cropped, B was bare fallowed to control weeds
Squarehead's Master	1916	W,W	Both T and B cropped as usual
Red Standard	1917-1925	W,W	Both T and B cropped as usual

Winter wheat (W) grown every year, except for occasional fallowing (no crop) to control weeds, shown as F. Year refers to the year in which the crop was harvested. Winter wheat was sown the previous autumn. The first crop was sown in autumn 1843 and harvested in summer 1844. Fertilizer and manures were applied to the different treatment strips, which ran the whole length of the field

Cropping on the whole field before the wheat experiment was started in 1843:			
Turnips	1839		FYM applied
Barley	1840		No fertilizer or manure
Peas	1841		No fertilizer or manure
Wheat	1842		No fertilizer or manure
Oats	1843		No fertilizer or manure

Broadbalk Cropping 1926 - 1967

See 1926-1967 plan for more details:

10.23637/rbk1-plan1926-67-01

Old section number ^a

Cultivar	Harvest Year	I	II	III	IV	V		
Red	1926	F	F	F	W	W		
Standard	1927	F	F	F	W	W		
"	1928	W	W	F	F	F		
S. Master*	1929	W	W	F	F	F		
Red	1930	W	W	W	W	W		
Standard	1931	F	W	W	W	W		
"	1932	W	F	W	W	W		
"	1933	W	W	W	W	F		
"	1934	W	W	W	F	W		
"	1935	W	W	F	W	W		
"	1936	F	W	W	W	W		
"	1937	W	F	W	W	W		
"	1938	W	W	W	W	F		
"	1939	W	W	W	F	W		
S. Master*	1940	W	W	F	W	W		
"	1941	F	W	W	W	W		
Stand up	1942	W	F	W	W	W		
S. Master*	1943	W	W	W	W	F		
Red	1944	W	W	W	F	W		
Standard	1945	W	W	F	W	W		
S. Master*	1946	F	W	W	W	W		
"	1947	W	F	W	W	W		
"	1948	W	W	W	W	F		
"	1949	W	W	W	F	W		
"	1950	W	W	F	W	W		
"	1951	F	W	W	W	W		
"	1952	W	F	W	W	W		
"	1953	W	W	W	W	F		
"	1954	W	W	W	F	W		
Section number:		IA	IB	II	III	IV	VA	VB
S. Master*	1955	W	W	W	F	W	W	W
"	1956	W	F	W	W	W	W	W
"	1957	W	W	F	W	W	W	W
"	1958	W	W	W	W	W	F	F
"	1959	W	W	W	W	F	W	W
"	1960	W	W	W	F	W	W	W
"	1961	W	F	W	W	W	W	W
"	1962	W	W	F	W	W	W	W
"	1963	W	W	W	W	W	F	W
"	1964	W	W	W	W	F	W	W
"	1965	W	W	W	F	W	W	W
"	1966	W	F	W	W	W	W	W
"	1967	W	W	F	W	W	W	W

1968 onwards, becomes new section number:

0 1 2 3 4 5 6 7 8 9

Note: *Squarehead's Master W=winter wheat, F=fallow (no crop)

^a 1926: the Experiment was divided into five sections, to allow sequential fallowing to control weeds.

1955: Section I divided into IA and IB. IB received herbicides and was no longer fallowed,

section IB continued the 5 year cycle of wheat and fallow.

Section V divided into VA and VB. VB received a single application of lime, VA did not.

1963: Section VB no longer fallowed, and received herbicides as required;
section VA continued with the 5 year wheat and fallow cycle.

1968: Divided to make 10 'New' sections, 0-9

Seed: New seed was bought each year up to 1963. From 1963 saved seed from the previous Broadbalk crop (bulked from several plots and well mixed) was sown.

Broadbalk Cropping 1968-2021

1st wheat shown in yellow

Layout groups sections to show development of the rotations. For layout in actual section order, see pp9-10

See 2018 plan for more details:

10.23637/rbk1-today2018-01

		New section number									
		Continuous wheat					Rotational wheat				
Wheat cultivar	Harvest Year	1	9	0"	8*	6**	5	3	7	4	2
Cappelle Desprez	1968	W	W	W	W	F	W	W	P	W	BE
Cappelle Desprez	1969	W	W	W	W	W	F	W	BE	P	W
Cappelle Desprez	1970	W	W	W	W	W	W	F	W	BE	P
Cappelle Desprez	1971	W	W	W	W	F	W	W	P	W	BE
Cappelle Desprez	1972	W	W	W	F	W	F	W	BE	P	W
Cappelle Desprez	1973	W	W	W	W	W	W	F	W	BE	P
Cappelle Desprez	1974	W	W	W	W	F	W	W	P	W	BE
Cappelle Desprez	1975	W	W	W	W	W	F	W	BE	P	W
Cappelle Desprez	1976	W	W	W	W	W	W	F	W	BE	P
Cappelle Desprez	1977	W	W	W	W	F	W	W	P	W	BE
Cappelle Desprez	1978	W	W	W	W	W	F	W	BE	P	W
Flanders	1979	W	W	W	W	W	W	F	W	P	F
Flanders	1980	W	W	W	W	W	W	W	F	W	P
Flanders	1981	W	W	W	F	W	W	W	P	F	W
Flanders	1982	W	W	W	W	W	W	W	W	P	F
Flanders	1983	W	W	W	W	W	W	W	F	W	P
Flanders	1984	W	W	W	W	W	W	W	P	F	W
Brimstone	1985	W	W	W	W	W	F	W	W	P	W
Brimstone	1986	W	W	W	W	W	P	F	W	W	W
B & SHM*	1987	W	W	W	W	W*	W	P	W	W	F
B & SHM*	1988	W	W*	W	F	W*	W	W*	F	W	P
B & SHM*	1989	W	W*	W	W	W*	W	W	P	F	W*
B & SHM*	1990	W	W*	W	W	W*	F	W	W*	P	W
Apollo	1991	W	W	W	W	W	P	F	W	W	W
Apollo	1992	W	W	W	W	W	W	P	W	W	F
Apollo	1993	W	W	W	W	W	W	W	F	W	P
Apollo	1994	W	W	W	F	W	W	W	P	F	W
Apollo	1995	W	W	W	W	W	F	W	W	P	W
Hereward	1996	W	W	W	W	W	P	O	W	W	W
Hereward	1997	W	W	W	W	W	W	M	W	W	O
Hereward	1998	W	W	W	W	W	W	W	O	W	M
Hereward	1999	W	W	W	W	W	W	W	M	O	W
Hereward	2000	W	W	W	W	W	O	W	W	M	W
Hereward	2001	W	W	W	F	W	M	O	W	W	W
Hereward	2002	W	W	W	W	W	W	M	W	W	O
Hereward	2003	W	W	F	W	W	W	W	O	W	M
Hereward	2004	W	W	F	W	W	W	W	M	O	W
Hereward	2005	W	W	W	W	W	O	W	W	M	W
Hereward	2006	W	W	W	W	W	M	O	W	W	W
Hereward	2007	W	W	W	W	W	W	M	W	W	O
Hereward	2008	W	W	W	F	W	W	W	O	W	M
Hereward	2009	W	W	W	W	W	W	W	M	O	W
Hereward	2010	W	W	W	W	W	O	W	W	M	W

Hereward	2011	W	W	W	W	W	M	O	W	W	W
Hereward	2012	W	W	W	W	W	W	M	W	W	O
Crusoe ^a	2013	W	W	W	W	W	W	W	O	W	M
Crusoe	2014	W	W	W	W	W	W	W	M	O	W
Mulika ^b	2015	W	W	W	F	W	O	W	W	M	W
Crusoe	2016	W	W	W	F	W	M	O	W	W	W
Crusoe	2017	W	W	W	W	W	W	M	W	W	O
Crusoe	2018	W	W	W	W	W	W	W	Be	O	W
Zyatt	2019	W	W	W	W	W	O	W	W	W	Be
Tybalt ^c	2020	W	W	W	W	W	W	O	W	Be	W
Zyatt	2021	W	W	W	W	W	Be	W	O	W	W

W=winter wheat, P=potatoes, BE=spring beans, F=fallow, O=winter oats, M=forage maize, Be=winter beans

"straw incorporated since autumn 1986 *no herbicides **no spring or summer fungicides since 1985

Section 0 fallowed in 2003 and 2004 in an attempt to control *Equisetum* and test various herbicides

B & SHM* comparison of modern variety Brimstone and old variety Squarehead's Master, except on FYM plots

Brimstone in all other sections 1985-1990

^a variety changed to Crusoe in 2013, but sown very late, due to a wet autumn and winter.

^b spring wheat variety Mulika sown in 2015, as wet autumn and winter prevented sowing of winter wheat.

^c spring wheat variety Tybalt sown in 2020, as wet autumn and winter prevented sowing of winter wheat

Winter wheat varieties selected primarily for their yield potential, and also their suitability for breadmaking.

Continuous wheat: Sections 0, 1, 6, 8 and 9

Section 0 has straw incorporated since 1986

Section 8 has no herbicides, so yields are restricted by weeds. It is fallowed frequently.

Section 6 was in a wheat/wheat/fallow rotation until 1979 and has restricted fungicide use.

Rotational wheat: Sections 2, 3, 4, 5 and 7

These Sections grow wheat in rotation with other arable crops (potatoes, maize, oats, beans & fallow).

Between 1968 and 1980 sections 3, 5 and 6 had a three year rotation of wheat/wheat/fallow.

Section 6 then became continuous wheat.

Between 1968 and 1978 sections 2, 4 and 7 had a three year rotation of wheat/potato/beans.

In 1979 this changed to a three year rotation of fallow/potato/wheat until 1984.

From around 1985 all sections changed to a five year rotation of wheat/wheat/wheat/fallow/potato until around 1996, then wheat/wheat/wheat/oats/maize until 2017.

In 2018 the rotation changed to wheat/wheat/oats/wheat/winter beans. Note there are two first wheats
Changes to rotation indicated by a thick line.

To select 1st wheat yields, eg Section 7, 1970, in the Data Extraction Tool select Yr-of-wheat = 1

To select 2nd wheat yields, eg Section 7, 1986, in the Data Extraction Tool select Yr-of-wheat = 2

To select 3rd wheat yields, eg Section 7, 1987, in the Data Extraction Tool select Yr-of-wheat = 3

Other crop cultivars

Spring field beans (*Vicia faba*): 1968-1978: Maris Bead (1968-74); Minor (1975) Minden (1976-78)

Winter field beans (*Vicia faba*) 2018 onwards: Tundra

Potato (*Solanum tuberosum*) 1968-1996: Majestic (1968-69); King Edward (1970-75);

Pentland Crown (1976-93); Estima (1994-96).

Forage maize (*Zea mays*) whole crop for silage: 1997-2017: Hudson (1997-2014); Severus (2015-2017)

Yields may have been reduced due to the accidental application of herbicide to the crop in June/July 2013

Winter oats (*Avena sativa*) 1996 onwards: Image (1996-2000); Revisor (2001), Gerald (2002 onwards)

Broadbalk Cropping 1968-2021

1st wheat

Layout in section order. See pp7-8 for layout which groups sections to show development of the rotations.

See 2018 plan for more details:

10.23637/rbk1-today2018-01

New section number

Wheat cultivar	Harvest Year	0"	1	2	3	4	5	6**	7	8*	9
Cappelle Desprez	1968	W	W	BE	W	W	W	F	P	W	W
Cappelle Desprez	1969	W	W	W	W	P	F	W	BE	W	W
Cappelle Desprez	1970	W	W	P	F	BE	W	W	W	W	W
Cappelle Desprez	1971	W	W	BE	W	W	W	F	P	W	W
Cappelle Desprez	1972	W	W	W	W	P	F	W	BE	F	W
Cappelle Desprez	1973	W	W	P	F	BE	W	W	W	W	W
Cappelle Desprez	1974	W	W	BE	W	W	W	F	P	W	W
Cappelle Desprez	1975	W	W	W	W	P	F	W	BE	W	W
Cappelle Desprez	1976	W	W	P	F	BE	W	W	W	W	W
Cappelle Desprez	1977	W	W	BE	W	W	W	F	P	W	W
Cappelle Desprez	1978	W	W	W	W	P	F	W	BE	W	W
Flanders	1979	W	W	F	F	P	W	W	W	W	W
Flanders	1980	W	W	P	W	W	W	W	F	W	W
Flanders	1981	W	W	W	W	F	W	W	P	F	W
Flanders	1982	W	W	F	W	P	W	W	W	W	W
Flanders	1983	W	W	P	W	W	W	W	F	W	W
Flanders	1984	W	W	W	W	F	W	W	P	W	W
Brimstone	1985	W	W	W	W	P	F	W	W	W	W
Brimstone	1986	W	W	W	F	W	P	W	W	W	W
B & SHM*	1987	W	W	F	P	W	W	W*	W	W	W
B & SHM*	1988	W	W	P	W*	W	W	W*	F	F	W*
B & SHM*	1989	W	W	W*	W	F	W	W*	P	W	W*
B & SHM*	1990	W	W	W	W	P	F	W*	W*	W	W*
Apollo	1991	W	W	W	F	W	P	W	W	W	W
Apollo	1992	W	W	F	P	W	W	W	W	W	W
Apollo	1993	W	W	P	W	W	W	W	F	W	W
Apollo	1994	W	W	W	W	F	W	W	P	F	W
Apollo	1995	W	W	W	W	P	F	W	W	W	W
Hereward	1996	W	W	W	O	W	P	W	W	W	W
Hereward	1997	W	W	O	M	W	W	W	W	W	W
Hereward	1998	W	W	M	W	W	W	W	O	W	W
Hereward	1999	W	W	W	W	O	W	W	M	W	W
Hereward	2000	W	W	W	W	M	O	W	W	W	W
Hereward	2001	W	W	W	O	W	M	W	W	F	W
Hereward	2002	W	W	O	M	W	W	W	W	W	W
Hereward	2003	F	W	M	W	W	W	W	O	W	W
Hereward	2004	F	W	W	W	O	W	W	M	W	W
Hereward	2005	W	W	W	W	M	O	W	W	W	W
Hereward	2006	W	W	W	O	W	M	W	W	W	W
Hereward	2007	W	W	O	M	W	W	W	W	W	W
Hereward	2008	W	W	M	W	W	W	W	O	F	W
Hereward	2009	W	W	W	W	O	W	W	M	W	W
Hereward	2010	W	W	W	W	M	O	W	W	W	W
Hereward	2011	W	W	W	O	W	M	W	W	W	W
Hereward	2012	W	W	O	M	W	W	W	W	W	W

Crusoe ^a	2013	W	W	M	W	W	W	W	O	W	W
Crusoe	2014	W	W	W	W	O	W	W	M	W	W
Mulika ^b	2015	W	W	W	W	M	O	W	W	F	W
Crusoe	2016	W	W	W	O	W	M	W	W	F	W
Crusoe	2017	W	W	O	M	W	W	W	W	W	W
Crusoe	2018	W	W	W	W	O	W	W	Be	W	W
Zyatt	2019	W	W	Be	W	W	O	W	W	W	W
Tybalt ^c	2020	W	W	W	O	Be	W	W	W	W	W
Zyatt	2021	W	W	W	W	W	Be	W	O	W	W

W=winter wheat, P=potatoes, BE=spring beans, F=fallow, O=winter oats, M=forage maize, Be=winter beans

"straw incorporated since autumn 1986 *no herbicides **no spring or summer fungicides since 1985

Section 0 fallowed in 2003 and 2004 in an attempt to control *Equisetum* and test various herbicides

B & SHM* comparison of modern variety Brimstone and old variety Squarehead's Master, except on FYM plots
Brimstone in all other sections 1985-1990

^a variety changed to Crusoe in 2013, but sown very late, due to a wet autumn and winter.

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Winter wheat varieties selected primarily for their yield potential, also their suitability for breadmaking

Continuous wheat: Sections 0, 1, 6, 8 and 9

Section 0 has straw incorporated since 1986

Section 8 has no herbicides, so yields are restricted by weeds. It is fallowed frequently.

Section 6 was in a wheat/wheat/fallow rotation until 1980 and has restricted fungicide use.

Rotational wheat: Sections 2, 3, 4, 5 and 7 (and 6 1968-1980), indicated by dotted line

These Sections grow wheat in rotation with other arable crops (potatoes, maize, oats, beans & fallow).

Between 1968 and 1980 sections 3, 5 and 6 had a three year rotation of wheat/wheat/fallow.

Section 6 then became continuous wheat.

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In 2018 the rotation changed to wheat/wheat/oats/wheat/winter beans. Note there are two first wheats

Changes to rotation indicated by a thick line.

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To select 2nd wheat yields, eg Section 7, 1986, in the Data Extraction Tool select Yr-of-wheat = 2

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Winter oats (*Avena sativa*) 1996 onwards: Image (1996-2000); Revisor (2001), Gerald (2002 onwards)