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Rothamsted Long-term Experiments Farm Diary and Yields of the Classical and Other Long-term Experiments Weather Summaries 2023



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2023/R/BK/1 - Broadbalk Winter Wheat

Rothamsted Research

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2023/R/BK/1 BROADBALK WINTER WHEAT

Object: To study the effects of organic manures and inorganic fertilisers on continuous winter wheat and wheat in rotation. From 1968 two three-year rotations were included: potatoes, beans, winter wheat and fallow, winter wheat, winter wheat. In 1979 the first rotation was changed to fallow, potatoes, winter wheat. In 1980 the second rotation reverted to continuous winter wheat. Since 1985 part of the second rotation was added to the first to extend the rotation to fallow, potatoes, winter wheat, winter wheat, winter wheat. In 1996 the fallow was replaced by winter oats and potatoes replaced by maize in 1997. In 2018 (175th year) winter beans (Be) replaced maize on the rotational sections and the rotation was changed to wheat, wheat, oats, wheat, beans. The new rotation includes two first wheats each year. Previously, only one first wheat was included in the rotation. This change has resulted in additional harvest sampling and analysis, to include both first wheats and the beans. 2023 was the 180th year of the experiment, for previous years see 'Details' 1967 and 1973, Station Report for 1966, pp. 229-231; Station Report for 1968, Part 2; Station Report for 1982, Part 2, pp 5-44 and Yield Books for 1974-2022/R/BK/1

Areas harvested

Crop	Section	Harvest area (ha)
Wheat	0	0.00305
	1	0.00561
	2,3,5 and 6	0.00463
	8, 9	0.00488
Oats	4	0.00463
Beans	7	0.00463

Current treatments

Strip	Treatment
01	N4
2.1	FYM N3
2.2	FYM
03	None
05	(P) K Mg
06	N1 (P) K Mg
07	N2 (P) K Mg
08	N3 (P) K Mg
09	N4 (P) K Mg
10	N4
11	N4 (P) Mg
12	N1+3+1 (P) K Mg
13	N4 (P) K
14	N4 (P) K* (Mg*)
15	N5 (P) K Mg
16	N6 (P) K Mg
17	N1+4+1 P K Mg
18	N1+2+1 P K Mg
19	N1+1+1 K Mg
20	N4 K Mg

Current treatment codes

<u>Winter wheat</u>	
N1, N2, N3, N4, N5, N6	48, 96, 144, 192, 240, 288 kg N as ammonium nitrate (33.5% N) applied at GS31 or mid-April
N1+1+1, N1+2+1, N1+3+1, N1+4+1	Rates as above, but in 3 splits: (1) first two weeks of March, (2) GS31 or mid-April (whichever comes first), and (3) GS37/mid-May
<u>Winter oats</u>	
½ N1, ½ N2, ½ N3, ½ N4, ½ N5, ½ N6	24, 48, 72, 96, 120, 144 kg N (i.e., half-rate of wheat) as ammonium nitrate (34.5% N) applied at GS31 or mid-April (oats received no N 1996-2017)
<u>Winter beans</u>	No N applied
<u>All crops</u>	
P	35 kg P as triple superphosphate
(P)	(no P since 2001 or 2020 - under review)
K	90 kg K as potassium sulphate
K*	90 kg K as muriate of potash (potassium chloride)
Mg	12 kg Mg as kieserite (magnesium sulphate)
(Mg*)	(no Mg since 2001 - under review)
FYM	Farmyard manure at 35 t (fresh weight); no FYM applied to beans (oats received no FYM 1996-2017)

Previous treatments

Strip	Treatments until 1967	Treatments from 1968	Treatments 1985-2000	Treatments 2001-2020
01	-	D N2 P K	D N4 P K	N4
2.1	D	D N2	D N2	FYM N3 ^(A)
2.2	D	D	D	FYM
03	None	None	None	None
05	P K Na Mg	P K (Na) Mg	PK Mg	(P) K Mg
06	N1 P K Na Mg	N1 P K (Na) Mg	N1 P K Mg	N1 (P) K Mg
07	N2 P K Na Mg	N2 P K (Na) Mg	N2 P K Mg	N2 (P) K Mg
08	N3 P K Na Mg	N3 P K (Na) Mg	N3 P K Mg	N3 (P) K Mg
09	N*1 P K Na Mg	N4 P K (Na) Mg	N4 P K Mg	N4 (P) K Mg
10	N2	N2	N2	N4
11	N2 P	N2 P	N2 P	N4 P Mg
12	N2 P Na	N2 P Na	N2 P Na	N1+3+1 (P) K Mg ^(B)
13	N2 P K	N2 P K	N2 P K	N4 P K
14	N2 P Mg	N2 P K Mg	N2 P K Mg	N4 P K* (Mg*)
15	N2 P K Na Mg	N3 P K(Na) Mg	N5 P K Mg	N5 (P) K Mg
16	N*2 P K Na Mg	N2 P K (Na) Mg	N6 P K Mg	N6 (P) K Mg
17	N2 ^(E)	N2 ½[P K (Na) Mg]	N1+3 ½[P K Mg] ^(E)	N1+4+1 P K Mg
18	P K Na Mg ^(E)	N2 ½[P K (Na) Mg]	N0+3 ½[P K Mg] ^(E)	N1+2+1 P K Mg
19	C	C	(C) (since 1989)	N1+1+1 K Mg
20	N2 K Na Mg	N2 K (Na) Mg	N2 K Mg	N4 K Mg

Notes:

- (A) N2 2001-2004
 (B) 24 kg Mg as kieserite 2001-2005 (plus 60 kg Mg in autumn 2000 only)
 (E) Treatments to strips 17 and 18 alternated; from 1968 both received N2 and ½-rate; PK(Na)Mg; from 1980 wheat received N1+3 (N1 in autumn in alternate years + N3 in spring); maize received N3 ½[P K Mg] 1996-2017 (treatments shown incorrectly in 1999-2002 Yield Books
 Oats received no N or FYM 1996-2017.

Previous treatment codes

N1, N2, N3, N4, N5, N6	48, 96, 144, 192, 240, 288 kg N as sulphate of ammonia until 1967 (except N* which was nitrate of soda), calcium ammonium nitrate (Nitro-chalk; c. 26%N) in spring (1968-1985), and ammonium nitrate (34.5% N) since 1986.
NO+3; N1+3	None in autumn + 144 kg N in spring; 48 kg N in autumn + 144 kg N in spring
P	35 kg P as triple superphosphate in 1974 and since 1988, single superphosphate in other years
K	90 kg K as sulphate of potash
K2	180 kg K as potassium sulphate (plus 450 kg K autumn 2000 only)
Na	55 kg Na as sulphate of soda
(Na)	16 kg Na as sulphate of soda until 1973
Mg	30 kg Mg annually to strip 14 (applied at 26 kg 1990-2000), 35 kg Mg every third year to other strips since 1974 (applied at 30 kg in 1991, 1994, 1997 and 2000 and at 15 kg on half rate treatments); all as kieserite since 1974, previously as sulphate of magnesia annually.
D	Farmyard manure at 35 t (fresh weight)
C	Castor meal to supply 96 kg N until 1988, none since
F	Full rate P K (Na) Mg as above
H	Half rate of above.

Cropping

Continuous winter wheat until 1967, with bare following one year in five from the 1920s. From 1968, the experiment was divided into 10 sections with crop rotations introduced alongside retained continuous winter wheat.

Cropping since 1968

Section Year	1	9	0*	8+	6**	5	3	7	4	2
1968	W	W	W	W	F	W	W	P	W	BE
1969	W	W	W	W	W	F	W	BE	P	W
1970	W	W	W	W	W	W	F	W	BE	P
1971	W	W	W	W	F	W	W	P	W	BE
1972	W	W	W	F	W	F	W	BE	P	W
1973	W	W	W	W	W	W	F	W	BE	P
1974	W	W	W	W	F	W	W	P	W	BE
1975	W	W	W	W	W	F	W	BE	P	W
1976	W	W	W	W	W	W	F	W	BE	P
1977	W	W	W	W	F	W	W	P	W	BE
1978	W	W	W	W	W	F	W	BE	P	W
1979	W	W	W	W	W	W	F	W	P	F
1980	W	W	W	W	W	W	W	F	W	P
1981	W	W	W	F	W	W	W	P	F	W
1982	W	W	W	W	W	W	W	W	P	F
1983	W	W	W	W	W	W	W	F	W	P
1984	W	W	W	W	W	W	W	P	F	W
1985	W	W	W	W	W	F	W	W	P	W
1986	W	W	W	W	W	P	F	W	W	W
1987	W	W	W	W	W	W	P	W	W	F
1988	W	W	W	F	W	W	W	F	W	P
1989	W	W	W	W	W	W	W	P	F	W
1990	W	W	W	W	W	F	W	W	P	W
1991	W	W	W	W	W	P	F	W	W	W
1992	W	W	W	W	W	W	P	W	W	F
1993	W	W	W	W	W	W	W	F	W	P
1994	W	W	W	F	W	W	W	P	F	W

Section Year	1	9	0*	8+	6**	5	3	7	4	2
1995	W	W	W	W	W	F	W	W	P	W
1996	W	W	W	W	W	P	O	W	W	W
1997	W	W	W	W	W	W	M	W	W	O
1998	W	W	W	W	W	W	W	O	W	M
1999	W	W	W	W	W	W	W	M	O	W
2000	W	W	W	W	W	O	W	W	M	W
2001 [†]	W	W	W	F	W	M	O	W	W	W
2002	W	W	W	W	W	W	M	W	W	O
2003	W	W	F	W	W	W	W	O	W	M
2004	W	W	F	W	W	W	W	M	O	W
2005	W	W	W	W	W	O	W	W	M	W
2006	W	W	W	W	W	M	O	W	W	W
2007	W	W	W	W	W	W	M	W	W	O
2008	W	W	W	F	W	W	W	O	W	M
2009	W	W	W	W	W	W	W	M	O	W
2010	W	W	W	W	W	O	W	W	M	W
2011	W	W	W	W	W	M	O	W	W	W
2012	W	W	W	W	W	W	M	W	W	O
2013	W	W	W	W	W	W	W	O	W	M
2014	W	W	W	W	W	W	W	M	O	W
2015 ⁺⁺	W	W	W	F	W	O	W	W	M	W
2016	W	W	W	F	W	M	O	W	W	W
2017	W	W	W	W	W	W	M	W	W	O
2018	W	W	W	W	W	W	W	Be	O	W
2019	W	W	W	W	W	O	W	W	W	Be
2020 ^{++,†}	W	W	W	W	W	W	O	W	Be	W
2021	W	W	W	W	W	Be	W	O	W	W
2022	W	W	W	F	W	W	Be	W	W	O
2023	W	W	W	W	W	W	W	Be	O	W

W: winter wheat

O: winter oats

P: potatoes

BE: spring beans

F: fallow

M: forage maize

Be: winter beans

* Straw incorporated since autumn 1986

** No sprays (i.e., no fungicides) except herbicides since 1985.

+ No herbicides

++ spring wheat in 2015 and 2020

† spring oats in 2001 and 2020

Notes

- For a fuller record of treatments see 'Details' etc.
- From autumn 1975 to autumn 1986, chalk was applied at 2.9 t/ha each autumn to all plots in sets of Sections on a three-year cycle. Year 1: Sections 1, 2, 3. Year 2: Sections 6, 7, 8, 9. Year 3: Sections 0, 4, 5. From autumn 1988 until autumn 1992 a five-year cycle was used. Year 1: Sections 1, 3. Year 2: Sections 2, 8. Year 3: Sections 7, 9. Year 4: Sections 4, 6. Year 5: Sections 0, 5 (omitted). No chalk was applied after autumn 1991 until autumn 2007 when differential amounts were applied to selected plots (see "Results 2008"). Chalk has been applied again on a five-year cycle from the 2013 crop (amounts applied being dependent on soil pH).
- In 2003 and 2004 Section 0 was used for an experiment (CS/595) investigating different herbicides to control *Equisetum arvense* L.
- Spring wheat was sown for the 2015 and 2020 crops (and spring oats in 2020) due to a preceding wet autumn and winter.
- Section 8 (no herbicides) was in bare fallow in 2015, 2016, and 2022 with two in-season cultivations (inversion ploughing) each year to control weeds.
- Triple superphosphate has been withheld from most strips since the 2001 (05-09, 12, 15-16) or 2021 (11, 13-14) crops, as soil P is not limiting currently and there is an objective to reduce soil P concentrations. This is being kept under review through monitoring soil P concentrations. The expectation is that as soon as one strip (that would normally receive P) requires P fertilisation, so all similar strips will re-start receiving P.

Rothamsted Long-Term Experiments: Farm Diary and Yields 2023

2023/R/BK/1

FARM DIARY

Date		Application	Rate	Unit
All Sections				
12/09/2023	f	Applied: Triple Superphosphate (TSP) using Exactomatic with JD5070; Strip 17, 18	171	kg/ha
12/09/2022	f	Applied: Muriate of Potash (MOP) using Exactomatic with JD5070: Strip 14	181	kg/ha
14/09/2022	a	Rolled using 6m Flexicoil Cambridge Roll with JD5620: Strip 1, 3, 5, 6, 7, 8, 9, 10, 11, 12, 13	-	-
15/09/2022	p	Sprayed: Buffalo Elite using Knight 24m Sprayer with NH T6030: Strip 1, 2.1, 2.2, 3, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20 (all Sections except Section 8).	1	L/ha
15/09/2022	p	Sprayed: Samurai (16238) using Knight 24m Sprayer with NH T6030: Strip 1, 2.1, 2.2, 3, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20 (all Sections except Section 8).	4	L/ha
28/09/2022	a	Plough using KV Five Furrow Plough with JD6145R	-	-
26/09/2022	f	Applied: Farmyard manure (FYM) using Muck spreader international with Tym T503: Strip 2.1, 2.2 (all Sections except Section 7).	35	t/ha
27/03/2023	f	Applied: Sulphate of Potash (SOP) using Cascade Spreader with JD6830: Strip 5, 6, 7, 8, 9, 12, 13, 15, 16, 17, 18, 19, 20	217	kg/ha
04/04/2023	f	Applied: Kieserite using Cascade Spreader with JD6830: Strip 5, 6, 7, 8, 9, 11, 12, 15, 16, 17, 18, 19, 20	80	kg/ha
01/06/2023	a	Power harrow paths using Kilworth Power Harrow 1.3 m with Iseki ISTH4335	-	-
10/07/2023	a	Hand weeding by Hand (11 wild oats pulled, 1 from plot 063 and 10 from plot 108): Strip 1, 2.1, 2.2, 3, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20	-	-
10/08/2023	a	Combine harvest using Claas Tucano 430	-	-
11/08/2023	a	Bailing (straw) using McHale Fusion 2 Baler with JD6145R Premium: Plot surrounds baled off	-	-
25/08/2023	a	Bailing (straw) using Amazone Grass Harvester - Flail Mower Collector with JD5070: straw pickup and weigh	-	-
W. Wheat				
16/09/2022 to 21/09/2022	f	Applied: Chalk using Quick Pass with JD5070: Plots 012, 015, 017, 2.10, 2.15, 2.17, 2.26, 2.27, 058, 061, 067, 068, 069, 070, 077, 078, 079, 082, 083, 087, 088, 089, 097, 098, 099, 100, 104, 106, 107, 112, 113, 114, 118, 121, 123, 130, 141, 142, 147, 157, 160, 162, 163, 167, 168, 177, 187, 188, 189, 190, 199	2	t/ha
16/09/2022 to 21/09/2022	f	Applied: Chalk using Quick Pass with JD5070: Plots 016, 2.16, 066, 071, 075, 076, 080, 081, 085, 086, 095, 096, 101, 105, 108, 110, 111, 117, 119, 120, 124, 127, 128, 129, 134, 137, 138, 139, 140, 148, 149, 150, 153, 155, 156, 158, 159, 161, 164, 165, 166, 169, 174, 175, 178, 179, 181, 195, 196, 197	4	t/ha
21/09/2022	f	Applied: Chalk using Quick Pass with JD5070: Plots 109, 115, 116, 125, 126, 135, 136, 144, 145, 146, 151, 154	6	t/ha
12/10/2022	s	Drilled: w. wheat (Zyatt) tr. Beret Gold (16430) using Accord Combination Drill No. 4 with JD6830: Strip 1, 2.1, 2.2, 3, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20; Section 0, 1, 2, 3, 5, 6, 8, 9	350	seeds/m ²
19/10/2022	p	Sprayed: Pontos (17811) using Knight 24m Sprayer with NH T6030: Strip 1, 2.1, 2.2, 3, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20; Section 0, 1, 2, 3, 5, 6, 9 (not Section 8).	1.0	L/ha

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19/10/2022	p	Sprayed: Firestarter (18422) using Knight 24m Sprayer with NH T6030: Strip 1, 2.1, 2.2, 3, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20; Section 0, 1, 2, 3, 5, 6, 9 (not Section 8).	0.3	L/ha
19/10/2022	p	Sprayed: Velomax (A0831) using Knight 24m Sprayer with NH T6030: Strip 1, 2.1, 2.2, 3, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20; Section 0, 1, 2, 3, 5, 6, 9 (not Section 8).	0.4	L/ha
22/11/2022	p	Sprayed: Hallmark with Zeon Technology (12629) using Knight 24m Sprayer with NH T6030: Strip 1, 2.1, 2.2, 3, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20; Section 0, 1, 2, 3, 5, 6, 8, 9	50	mL/ha
27/03/2023	f	Applied: Yara Bela Extran (33.5% N) using Cascade Spreader with JD6830: Strip 12, 17, 18, 19; Section 0, 1, 2, 3, 5, 6, 8, 9	143	kg/ha
11/04/2023	p	Sprayed: Orius P (18994) using Agribuggy2 AB30: Strip 1, 2.1, 2.2, 3, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20; Section 0, 1, 2, 3, 5, 8, 9 (not Section 6)	1	L/ha
11/04/2023	p	Sprayed: Moddus (15151) using Agribuggy2 AB30: Strip 1, 2.1, 2.2, 3, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20; Section 0, 1, 2, 3, 5, 8, 9 (not Section 6)	0.2	L/ha
11/04/2023	p	Sprayed: Stefes CCC 720 (17731) using Agribuggy2 AB30: Strip 1, 2.1, 2.2, 3, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20; Section 0, 1, 2, 3, 5, 8, 9 (not Section 6)	1.3	L/ha
17/04/2023	p	Sprayed: Moddus (15151) using Agribuggy2 AB30: Strip 1, 2.1, 2.2, 3, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19; Section 6	0.2	L/ha
17/04/2023	p	Sprayed: Stefes CCC 720 (17731) using Agribuggy2 AB30: Strip 1, 2.1, 2.2, 3, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19; Section 6	1.3	L/ha
18/04/2023	f	Applied: Yara Bela Extran (33.5% N) using Cascade Spreader with JD6830: Strip 6, 19; Section 0, 1, 2, 3, 5, 6, 8, 9	143	kg/ha
18/04/2023	f	Applied: Yara Bela Extran (33.5% N) using Cascade Spreader with JD6830: Strip 7, 18; Section 0, 1, 2, 3, 5, 6, 8, 9	287	kg/ha
18/04/2023	f	Applied: Yara Bela Extran (33.5% N) using Cascade Spreader with JD6830: Strip 8, 12; Section 0, 1, 2, 3, 5, 6, 8, 9	430	kg/ha
18/04/2023	f	Applied: Yara Bela Extran (33.5% N) using Exactomatic with MF3070: Strip 2.1; Section 0, 1, 2, 3, 5, 6, 8, 9	430	kg/ha
18/04/2023	f	Applied: Yara Bela Extran (33.5% N) using Cascade Spreader with JD6830: Strip 1, 9, 10, 11, 13, 14, 17, 20; Section 0, 1, 2, 3, 5, 6, 8, 9	573	kg/ha
18/04/2023	f	Applied: Yara Bela Extran (33.5% N) using Cascade Spreader with JD6830: Strip 15; Section 0, 1, 2, 3, 5, 6, 8, 9	716	kg/ha
18/04/2023	f	Applied: Yara Bela Extran (33.5% N) using Cascade Spreader with JD6830: Strip 16; Section 0, 1, 2, 3, 5, 6, 8, 9	860	kg/ha
25/04/2023	p	Sprayed: Presite SX (18776) using Agribuggy2 AB30: Strip 1, 2.1, 2.2, 3, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19; Section 6	60	g/ha
03/05/2023	p	Sprayed: Presite SX (18776) using Agribuggy2 AB30: Strip 1, 2.1, 2.2, 3, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20; Section 0, 1, 2, 3, 5, 9	60	g/ha
03/05/2023	p	Sprayed: Lentyma XE (19301) using Agribuggy2 AB30: Strip 1, 2.1, 2.2, 3, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20; Section 0, 1, 2, 3, 5, 9	0.8	L/ha
03/05/2023	p	Sprayed: Arizona (15318) using Agribuggy2 AB30: Strip 1, 2.1, 2.2, 3, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22; Section 0, 1, 2, 3, 5, 9	1.5	L/ha
11/05/2023	p	Sprayed: Lentyma XE (19301) using Agribuggy2 AB30: Strip 2.1, 2.2, 3, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19; Section 8	0.8	L/ha
11/05/2023	p	Sprayed: Arizona (15318) using Agribuggy2 AB30: Strip 2.1, 2.2, 3, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19; Section 8	1.5	L/ha
11/05/2023	p	Sprayed: Lentyma XE (19301) using Agribuggy2 AB30: Strip 2.1, 2.2, 3, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19; Section 8	0.8	L/ha
16/05/2023	f	Applied: Yara Bela Extran (33.5% N) using Cascade Spreader with JD6830: Strip 12, 17, 18, 19; Section 0, 1, 2, 3, 5, 6, 8, 9	143	kg/ha

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2023/R/BK/1

23/05/2023	p	Sprayed: Lentyma XE (19301) using Agribuggy2 AB30: Strip 1, 2.1, 2.2, 3, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20; Section 0, 1, 2, 3, 5, 8, 9 (not Section 6)	0.9	L/ha
10/06/2023	p	Sprayed: Oraso Pro (19321) using Agribuggy2 AB30: Strip 1, 2.1, 2.2, 3, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20; Section 0, 1, 2, 3, 5, 8, 9 (not Section 6)	0.9	L/ha
01/08/2023	a	Topping using Topper 9 with JD6230: Boundary of Section 8 (herbicide-free)	-	-
W. Oats				
20/09/2022	f	Applied: Chalk using Quick Pass with JD5070: Plots 104, 114	2	t/ha
16/09/2022 to 20/09/2022	f	Applied: Chalk using Quick Pass with JD5070: Plots 124, 134, 164, 174	4	t/ha
21/09/2022	f	Applied: Chalk using Quick Pass with JD5070: Plots 144, 154	6	t/ha
14/11/2022	p	Sprayed: Buffalo Elite using Knight 24m Sprayer with NH T6030: Strip 1, 2.1, 2.2, 3, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19; Section 4	1	L/ha
14/11/2022	p	Sprayed: Samurai (16238) using Knight 24m Sprayer with NH T6030: Strip 1, 2.1, 2.2, 3, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19; Section 4	2	L/ha
23/11/2022	s	Drilled: Winter Oats (Mascani) dr. Raxil star (17805) using Accord Combination Drill No. 4 with JD6830: Strip 1, 2.1, 2.2, 3, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19; Section 4	350	seeds/m ²
18/04/2023	f	Applied: Yara Bela Extran (33.5% N) using Cascade Spreader with JD6830: Strip 8, 19; Section 4	215	kg/ha
19/04/2023	f	Applied: Yara Bela Extran (33.5% N): Strip 6; Section 4	72	kg/ha
19/04/2023	f	Applied: Yara Bela Extran (33.5% N): Strip 7; Section 4	143	kg/ha
19/04/2023	f	Applied: Yara Bela Extran (33.5% N): Strip 12, 15; Section 4	358	kg/ha
19/04/2023	f	Applied: Yara Bela Extran (33.5% N): Strip 16, 17; Section 4	430	kg/ha
20/04/2023	f	Applied: Yara Bela Extran (33.5% N) by Hand: Strip 2.1; Section 4	215	kg/ha
20/04/2023	f	Applied: Yara Bela Extran (33.5% N) using Cascade Spreader with JD6830: Strip 1, 9, 10, 11, 13, 14, 18; Section 4	287	kg/ha
22/05/2023	p	Sprayed: Paramount Max (18751) using Agribuggy2 AB30: Strip 1, 2.1, 2.2, 3, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19; Section 4	25	g/ha
22/05/2023	p	Sprayed: Stefes CCC 720 (17731) using Agribuggy2 AB30: Strip 1, 2.1, 2.2, 3, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19; Section 4	1.5	L/ha
22/05/2023	p	Sprayed: Bugle (17821) using Agribuggy2 AB30: Strip 1, 2.1, 2.2, 3, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19; Section 4	0.7	L/ha
W. Beans				
16/09/2022 to 20/09/2022	f	Applied: Chalk using Quick Pass with JD5070: Plots 017, 2.17, 2.27, 067, 077, 087, 097, 107, 147, 157, 167, 177, 187	2	t/ha
16/09/2022 to 20/09/2022	f	Applied: Chalk using Quick Pass with JD5070: Plots 117, 127, 137, 197	4	t/ha
10/10/2022	s	Drilled: Winter Beans (Tundra) using Accord Combination Drill No. 4 with JD6830: Strip 1, 2.1, 2.2, 3, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19; Section 7	25	seeds/m ²
19/10/2022	p	Sprayed: Kerb Flo 500 (15586) using Knight 24m Sprayer with NH T6030: Strip 1, 2.1, 2.2, 3, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19; Section 7	1.7	L/ha
19/10/2022	p	Sprayed: Stomp Aqua (14664) using Knight 24m Sprayer with NH T6030: Strip 1, 2.1, 2.2, 3, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19; Section 7	2.9	L/ha

Rothamsted Long-Term Experiments: Farm Diary and Yields 2023

2023/R/BK/1

19/10/2022	p	Sprayed: Velomax (A0831) using Knight 24m Sprayer with NH T6030: Strip 1, 2.1, 2.2, 3, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19; Section 7	0.4	L/ha
20/04/2023	p	Sprayed: Basagran SG (08360) using Agribuggy2 AB30: Strip 1, 2.1, 2.2, 3, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19; Section 7	1.1	kg/ha
20/04/2023	p	Sprayed: Zarado (A0516) using Agribuggy2 AB30: Strip 1, 2.1, 2.2, 3, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19; Section 7	1.0	L/ha
11/05/2023	p	Sprayed: Tacanza Era (19217) using Agribuggy2 AB30: Strip 1, 2.1, 2.2, 3, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19; Section 7	0.7	L/ha
07/06/2023	p	Sprayed: Simveris (19619) using Agribuggy2 AB30: Strip 1, 2.1, 2.2, 3, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19; Section 7	0.8	L/ha
07/06/2023	p	Sprayed: Azoxystar (17407) using Agribuggy2 AB30: Strip 1, 2.1, 2.2, 3, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 21, 22; Section 7	0.5	L/ha
13/06/2023	p	Sprayed: Aphox (18562) using Agribuggy2 AB30: Strip 1, 2.1, 2.2, 3, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19; Section 7	0.3	kg/ha
26/07/2023	p	Sprayed: Samurai (16238) using Agribuggy2 AB30: Strip 1, 2.1, 2.2, 3, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19; Section 7	3.0	L/ha
26/07/2023	p	Sprayed: Buffalo Elite using Agribuggy2 AB30: Strip 1, 2.1, 2.2, 3, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19; Section 7	1.0	L/ha
Wilderness				
13/06/2023		Mowing on Mown area: Kilworth Topper with ISEKI ISTH4335	-	-

Notes

- Samples of grain and straw were taken for chemical analysis. Unground grain and straw samples from selected treatments were archived.
- Grain quality analyses completed on selected samples.
- Soil sampling for chemical analysis and archiving: Section 5 (all plots); 0-23 cm depth; 25/08/2023.

YIELDS

WINTER WHEAT: GRAIN YIELD (t/ha; 85% DM)

Continuous/Rotation		C	C	C	C	C	C	R	R	R	Mean
Section		0	1	6	8	9	2	3	5		
Wheat crop (year)		19	57	46	1	1 ^(clean)	65	1	1	2	
Strip	Treatment										
01	(FYM)N4	-	-	4.50	-	-	-	7.27	8.37	8.70	7.21
2.1	FYMN3	6.95	7.50	5.50	3.30	2.85	7.95	8.67	9.80	10.07	7.47
2.2	FYM	4.95	5.70	5.76	3.83	3.28	6.06	6.67	8.10	7.44	6.06
03	Nil	0.67	0.60	0.87	2.30	2.03	0.22	0.57	2.42	1.85	1.19
05	(P)KMg	0.76	0.95	1.05	3.39	2.84	0.72	0.83	2.81	2.27	1.60
06	N1(P)KMg	3.85	4.12	3.38	3.08	2.61	3.81	4.36	5.73	5.09	4.18
07	N2(P)KMg	5.57	5.86	4.31	4.20	3.68	5.43	6.12	7.38	7.02	5.74
08	N3(P)KMg	5.76	6.67	3.98	5.17	4.75	6.60	7.39	8.47	7.68	6.46
09	N4(P)KMg	6.69	7.19	3.60	5.84	5.41	7.31	7.13	8.38	7.68	6.73
10	N4	1.29	2.68	1.94	4.58	4.26	2.17	2.74	4.97	5.84	3.27
11	N4(P-)Mg	6.55	6.43	2.48	4.56	4.21	4.59	6.36	7.12	6.61	5.59
12	N1+3+1(P)KMg	7.77	7.97	3.40	5.24	4.90	7.78	8.43	9.18	9.16	7.37
13	N4(P-)K	7.38	7.44	3.98	5.27	4.93	6.59	8.09	8.82	7.72	6.91
14	N4(P)K*(Mg*)	5.68	4.28	3.36	6.03	5.43	5.32	4.76	6.64	5.58	5.21
15	N5(P)KMg	7.02	7.02	4.04	5.38	4.53	6.53	7.77	9.00	8.20	6.87
16	N6(P)KMg	7.00	7.64	3.50	5.42	5.12	6.94	8.24	8.88	8.02	6.95
17	N1+4+1PKMg	8.13	8.63	4.09	4.27	3.81	8.36	9.25	9.52	9.54	7.73
18	N1+2+1PKMg	7.61	7.67	4.44	3.33	2.98	7.51	8.64	9.17	9.02	7.18
19	N1+1+1KMg	6.79	6.32	4.79	3.94	3.48	6.68	6.84	7.83	7.96	6.40
20	N4KMg	2.27	0.35	-	-	-	-	-	-	-	1.31
Mean		5.41	5.53	3.63	4.40	3.95	5.59	6.32	7.50	7.13	5.70
Grain mean DM%		87.0									

Notes

- Clean grain (2.0-3.5 mm) yield, after removing weed seed (<2-mm) as was the practice prior to 2012.
- Overall treatment means based on original (not clean) grain yield of Section 8.
- Plot 142 (N4(P)K*(Mg*)) had message: 'Grain tank is full!'. Weight recorded was assumed to be correct.

WINTER WHEAT: STRAW YIELD (t/ha; 85% DM)

Continuous/Rotation	C	C	C	C	C	R	R	R	Mean
Section	0	1	6	8	9	2	3	5	
Wheat crop (year)	19	57	46	1	65	1	1	2	
Strip	Treatment								
01	(FYM)N4	-	-	-	-	3.40	4.08	-	3.74
2.1	FYMN3	-	4.04	-	1.53	-	4.39	4.96	3.73
2.2	FYM	-	2.39	-	3.66	-	2.18	5.28	3.38
03	Nil	-	0.07	-	1.58	-	0.64	0.81	0.77
05	(P)KMg	-	0.05	-	2.19	-	0.22	0.79	0.81
06	N1(P)KMg	-	1.07	-	2.46	-	1.49	1.80	1.70
07	N2(P)KMg	-	1.43	-	3.20	-	1.99	2.90	2.38
08	N3(P)KMg	-	1.70	-	3.24	-	2.55	2.72	2.55
09	N4(P)KMg	-	2.73	-	3.29	-	2.51	2.78	2.83
10	N4	-	1.32	-	1.90	-	0.74	1.91	1.47
11	N4(P-)Mg	-	2.60	-	3.23	-	2.49	3.02	2.84
12	N1+3+1(P)KMg	-	3.31	-	2.03	-	2.41	5.42	3.29
13	N4(P-)K	-	3.96	-	0.62	-	2.80	2.23	2.40
14	N4(P)K*(Mg*)	-	1.43	-	2.02	-	1.16	2.64	1.81
15	N5(P)KMg	-	2.46	-	4.08	-	2.77	3.28	3.15
16	N6(P)KMg	-	2.64	-	3.02	-	1.69	3.77	2.78
17	N1+4+1PKMg	-	2.72	-	4.71	-	3.25	4.40	3.77
18	N1+2+1PKMg	-	2.26	-	4.44	-	2.84	2.87	3.11
19	N1+1+1KMg	-	2.31	-	3.85	-	3.78	3.99	3.48
20	N4KMg	-	0.17	-	-	-	-	-	0.17
Mean		-	2.04	-	2.84	-	3.40	4.08	2.57
Straw mean DM%									90.6

Notes

- Plot 051 ((P)KMg) had no straw yield data; full sample sent for Sample Processing was assumed to be the yield (248.4 g).

WINTER OATS AND WINTER BEANS: GRAIN AND STRAW YIELD (t/ha; 85% DM)

Winter Oats (Section 4)				Winter Beans (Section 7)			
Plot	Treat	Grain	Straw	Plot	Treat	Grain	Straw
014	(FYM)½N4	3.92	3.34	017	(FYM) [N4]	4.02	1.45
214	FYM½N3	5.23	4.03	217	[FYMN3]	3.44	4.56
224	FYM	4.37	2.53	227	[FYM]	3.65	3.23
034	Nil	0.63	0.38	037	Nil	1.08	0.63
054	(P)KMg	0.90	0.30	057	(P)KMg	3.93	3.42
064	½N1(P)KMg	2.03	0.69	067	[N1](P)KMg	3.83	-
074	½N2(P)KMg	2.98	1.83	077	[N2](P)KMg	3.45	2.64
084	½N3(P)KMg	3.68	1.61	087	[N3](P)KMg	3.72	5.05
094	½N4(P)KMg	5.28	1.94	097	[N4](P)KMg	3.73	1.25
104	½N4	2.26	0.98	107	[N4]	1.45	1.03
114	½N4(P)Mg	5.45	2.68	117	[N4](P)Mg	0.09	-
124	½N5(P)KMg	3.88	2.82	127	[N1+3+1](P)KMg	3.55	-
134	½N4(P)K	3.53	-	137	[N4](P)K	3.33	3.05
144	½N4(P)K*(Mg*)	2.40	1.42	147	[N4](P)K*(Mg*)	3.24	0.40
154	½N5(P)KMg	3.94	1.19	157	[N5](P)KMg	3.63	3.83
164	½N6(P)KMg	3.59	1.97	167	[N6](P)KMg	3.28	1.19
174	½N6PKMg	6.19	2.56	177	[N1+4+1]PKMg	3.82	2.58
184	½N4PKMg	3.61	2.59	187	[N1+2+1]PKMg	3.67	3.58
194	½N3KMg	3.51	1.86	197	[N1+1+1]KMg	3.15	-
Mean		3.55	1.93	Mean		3.16	2.53
DM(%)		87.1	86.8	DM(%)		86.8	90.4

Notes

- Note from Farm on 13/10/2022 to report a mistake in drilling northern half of plot 134 (½N4(P*)K) with w. wheat when it should have been w. oats. The plan was to wait a week for the wheat to emerge, then spray it off and drill Section 4 with w. oats.
- No w. oat straw from plot 134 (½N4(P*)K).
- No w. bean straw from plots 067 ([N1](P)KMg), 117 ([N4](P)Mg), 127 ([N1+3+1](P)KMg), and 197 ([N1+1+1]KMg).