ROTHAMSTED RESEARCH

Yields of the Field Experiments

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ROTHAMSTED RESEARCH

Results of the Classical and other Long-term Experiments 2019

19/R/BK/1 - Broadbalk

Rothamsted Research

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19/R/BK/1 BROADBALK

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.

2019 was the 176th 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 74-18/R/BK/1.

Areas harvested [a]:

	Section	
Wheat:	0	0.00305
	1	0.00561
	4, 7 and 6	0.00463
	8, 9	0.00488
Oats:	5	0.00463
Beans:	2	0.00463

[a] The new Haldrup combine has a slightly smaller cut width (2.0m) than the previous Sampo combine (2.1m). Consequently, from 2017 cereal yields were based on a 2.0m cut width. This was also the case for cereals on the other long-term experiments. Maize yields are calculated using a row spacing of 0.7m. Maize yields for 2009-2016 were recalculated to account for the increase in row width from 0.6m to 0.7m in 2009. The corrected yields are given in the 2016 yield book.

Treatments:
In 2001 some of the treatments were changed. The treatments are now:
Whole plots

PLOT	Fertilizers and organic manures Treatments	
	Plot	From 2001
01 (FYM)N4	01	N4
21FYMN3	2.1	FYM N2 (1)
22FYM	2.2	FYM
03Nil	03	None
05(P)KMg	05	(P) K Mg
06N1 (P) KMg	06	N1 (P) K Mg
07N2(P)KMg	07	N2 (P) K Mg
08N3(P)KMg	08	N3 (P) K Mg
09N4(P)KMg	09	N4 (P) K Mg
10N4	10	N4
11N4PMg	11	N4 P Mg

12N1+3+1(P)K2Mg2	12	N1+3+1 (P) K2 Mg2 (2)
13N4PK	13	N4 P K
14N4PK*(Mg*)	14	N4 P K* (Mg*)
15N5(P)KMg	15	N5 (P) K Mg
16N6(P)KMg	16	N6 (P) K Mg
17N1+4+1PKMg	17	N1+4+1 P K Mg
18N1+2+1PKMg	18	N1+2+1 P K Mg
19N1+1+1KMg	19	N1+1+1 K Mg
20N4KMg	20	N4 K Mg

(1) FYM N3 since 2005
(2) N1+3+1 (P) KMg since 2006

Winter wheat – single N to wheat
N1, N2, N3, N4, N5, N6: 48, 96, 144, 192, 240, 288 kg N as 34.5% N; to be applied at the same time as the second dressings in the split nitrogen plots for wheat.

- split N to wheat
N1+1+1, 1+2+1 etc: Rates as above. Timings: first two weeks of March, GS31 or mid-April (whichever comes first) and GS37/mid-May.

Winter oats – single N application
½ N1, ½ N2, ½ N3, ½ N4, ½ N5, ½ N6: 24, 48, 72, 96, 120, 144 kg N as 34.5%N; applied at half the rate for wheat in a single application in mid-April; FYM applied at 35t/ha (fresh wt). Oats received no N or FYM from 1996 to 2017.

Winter Beans (Be) Non N or FYM applied.

All crops: P, K, Mg & FYM applications as shown below:-
P: 35 kg P as triple superphosphate
(P): (none since 2001), to be reviewed in 2018/19.
K: 90 kg K as potassium sulphate.
K2: 180 kg K as potassium sulphate (plus 450 kg K autumn 2000 only)
K*: 90 kg K as potassium chloride
Mg: 12 kg Mg as kieserite.
Mg2: 24 kg Mg as kieserite (plus 60kg Mg, autumn 2000 only).
(Mg*): (none since 2001), to be reviewed in 2018/19
FYM: Farmyard manure at 35 t

Previous treatment:
Whole plots

PLOT		Fertilizers and organic manures:-		
	Plot	Treatments until 1967	Treatments from 1968	Treatments from 1985 – 2000
01DN4PK	01	-	D N2 P K	D N4 P K
21DN2	21	D	D N2	D N2
22D	22	D	D	D
030	03	None	None	None
05F	05	P K Na Mg	P K (Na) Mg	PK Mg
06N1F	06	N1 P K Na Mg	N1 P K (Na) Mg	N1 P K Mg

07N2F	07	N2 P K Na Mg	N2 P K (Na) Mg	N2 P K Mg
08N3F	08	N3 P K Na Mg	N3 P K (Na) Mg	N3 P K Mg
09N4F	09	N*1 P K Na Mg	N4 P K (Na) Mg	N4 P K Mg
10N2	10	N2	N2	N2
11N2P	11	N2 P	N2 P	N2 P
12N2PNA	12	N2 P Na	N2 P Na	N2 P Na
13N2PK	13	N2 P K	N2 P K	N2 P K
14N2PKMG	14	N2 P Mg	N2 P K Mg	N2 P K Mg
15N5F	15	N2 P K Na Mg	N3 P K(Na) Mg	N5 P K Mg
16N6F	16	N*2 P K Na Mg	N2 P K (Na) Mg	N6 P K Mg
17N1+3FH	17	N2 (A)	N2 ½[P K (Na) Mg]	N1+3 ½[P K Mg] (A)+
18N0+3FH	18	P K Na Mg (A)	N2 ½[P K (Na) Mg]	N0+3 ½[P K Mg] (A)+
19(C)	19	C	C	(C) (since 1989)
20N2KMG	20	N2 K Na Mg	N2 K (Na) Mg	N2 K Mg

(A) Alternating each year
+ This change since 1980. Treatments shown are those to winter wheat; autumn N alternates. Maize received N3 ½[PK Mg] on both plots 17 and 18. These treatments shown incorrectly in 1999-2002 Yield books.
Winter oats; Nitrogen and dung were not applied 1996-2017.

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. All as 'Nitro-Chalk' in spring from 1968 to 1985, as 34.5% N since 1986.
N0+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
Na:	55 kg Na as sulphate of soda
(Na):	16 kg Na as sulphate of soda until 1973
Mg:	30kg Mg annually to Plot 14 (applied at 26 kg 1990 to 2000), 35 kg Mg every third year to other plots 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
(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.

Strips of sub-plots: Until 1967 wheat alone was grown on the experiment, with some bare fallowing. From 1968, the experiment was divided into 10 sections with the following cropping:

SECTION

Section	1	9	0*	8+	6**	5	3	7	4	2
Year										
1968	W	W	W	W	F	W	W	P	W	BE
1969	W	W	W	W	W	F	W	BE	P	W

Section Year	1	9	0*	8+	6**	5	3	7	4	2
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
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

Section	1	9	0*	8+	6**	5	3	7	4	2
Year										
2019	W	W	W	W	W	O	W	W	W	Be

W = winter wheat, O = winter oats (spring oats 2001), P = potatoes, BE = spring beans, F = fallow, M = forage maize, Be = Winter Beans

* Straw incorporated since autumn 1986. ** No sprays except weedkillers since 1985.

+ No weedkillers.

++ Spring Wheat in 2015

NOTES:

(1) For a fuller record of treatments see 'Details' etc.

(2) From autumn 1975 to autumn 1986, chalk was applied at 2.9t 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 was applied again to selected plots in autumn 2013, see 14/R/BK/1 diary information.

(3) In 2003 and 2004 section 0 was used for an experiment (CS/595) investigating different herbicides to control *Equisetum arvense*.

(4) In 2013 the wheat variety changed from Hereward to Crusoe, but it was sown very late (22nd February 2013) because of the very wet autumn and winter of 2012-13.

(5) Spring wheat (var Mulika) and winter oats (var Gerald) were sown in March 2015, instead of in autumn/winter 2014, because the very wet soil conditions in autumn 2014 prevented sowing of a winter crop. The whole site was spring-tine cultivated in March 2015 instead of being ploughed. Section 8 was left in bare fallow in 2015 & 2016 and had two in-season cultivations (inversion ploughing) each year to control weeds.

(6) In 2018 winter beans (Be) replaced maize on the rotational sections to give a five year rotation of wheat, wheat, oats, wheat, beans. Details of changes to N fertilizer and FYM applications are given on p2.

19/R/BK/1 Experimental Diary:

Date		Application	Rate	Unit
All Sections				
12/09/2018	f	Applied TSP Treatments - to strips 11, 13, 14, 17 + 18	171	kg/ha
12/09/2018	f	Applied MOP Treatments - to strip 14	181	kg/ha
13/09/2018	f	Applied Chalk - to plots 2.10, 070, 080, 100, 110, 140, 160, 081, 101, 111, 151, 012, 072, 082, 152, 153, 134, 144, 154, 075, 085, 105, 115, 125, 135, 145, 155, 066, 076, 086, 126, 136, 156, 196, 017, 067, 077, 097, 107, 117, 127, 137, 147, 157, 177, 058, 068, 078, 098 ,138, 148, 168, 178, 188, 069, 099, 109, 139, 149, 169, 179, 189, 199	2	t /ha
13/09/2018	f	Applied Chalk - to plots 150, 161, 195, 106, 116, 087, 167, 088, 108, 118, 128, 158, 198, 089, 119, 129, 159	4	t /ha

13/09/2018	p	Sprayed Buffalo Elite	1	lt/ha
13/09/2018	p	Sprayed Buffalo Samurai	2.5	lt/ha
18/09/2018	a	Ploughing Field	-	-
19/09/2018	a	Cultipressed Ploughing	-	-
27/09/2018	a	Watkins Pressed All Ploughing	-	-
04/10/2018	a	Ring Rolled Wheat Drilling	-	-
26/03/2019	a	Flexitined surrounds	-	-
11/04/2019	a	Cut Paths	-	-
29/04/2019	a	Cut Paths	-	-
13/05/2019	a	Topped paths - Section 8	-	-
20/05/2019	f	applied Kieserite - to strips 20, 19, 18, 17, 16, 15, 12, 11, 9, 8, 7, 6 + 5	80	kg/ha
21/05/2019	f	Applied SOP - to strips - 20, 19, 18, 17, 16, 15, 13, 12, 9, 8, 7, 6 + 5	217	kg/ha
25/06/2019	a	Rotavated all paths	-	-
11/07/2019	a	Removed Wild Oats from plots	22	plants
29/07/2019	a	Topped plot ends	-	-
06/09/2019	a	Straw weights	-	-
07/09/2019	a	Harvested Commercial Area	-	-
09/09/2019	a	Bale surplus straw from plots	-	-
12/09/2019	a	Rolled by flexicoil	-	-

W WHEAT

17/09/2018	f	Applied FYM - to Strip 2.1 and 2.2 excluding Section 2	35	t /ha
03/10/2018	s	Drilled Zyatt, trt. Beret Gold/Deter	350	seed/m^2
05/10/2018	p	Sprayed Pontos	1	lt/ha
05/10/2018	p	Sprayed Firestorm	300	ml/ha
05/10/2018	p	Sprayed Velomax	400	ml/ha
26/11/2018	p	sprayed Hallmark - not Section 2	5	ml/ha
21/03/2019	p	Sprayed X-Clude - to Sections 0 1 3 4 6 7 + 9	250	ml/ha
21/03/2019	p	Sprayed Cintac - to Sections 0 1 3 4 6 7 + 9	500	rm/ha
21/03/2019	p	Sprayed Cogent - to Sections 0 1 3 4 6 7 + 9	1	lt/ha
25/03/2019	f	Applied Nitram (1^{st} split) - to strips 12 17 18 + 19	139	kg/ha
01/04/2019	p	Sprayed stefes720 - Section 6	1.25	lt/ha
01/04/2019	p	Sprayed Moddus - Section 6	150	ml/ha
01/04/2019	p	Sprayed Artemis - not Sections 6 or 8	1	lt/ha
01/04/2019	p	Sprayed Stefes720 - not Sections 6 or 8	1.25	lt/ha
01/04/2019	p	Sprayed Moddus - not Sections 6 or 8	150	ml/ha
01/04/2019	p	Sprayed Bravo500 - not Sections 6 or 8	1	lt/ha
12/04/2019	f	Applied Nitram - to strips 15	696	kg/ha
12/04/2019	f	Applied Nitram - to strips 16	835	kg/ha
12/04/2019	f	Applied Nitram (2^{nd} split) - to strips 19	139	kg/ha
12/04/2019	f	Applied Nitram (2^{nd} split) - to strips 18, 7	278	kg/ha
12/04/2019	f	Applied Nitram - to strips 12, 8, 2.1	417	kg/ha
12/04/2019	f	Applied Nitram - to strips 20, 17, 14, 13, 11, 10, 9	556	kg/ha
09/05/2019	p	Sprayed SimbaSX - Sections 0, 1, 3, 4, 7 + 9	30	gm/ha
09/05/2019	p	Sprayed Keystone - Sections 0, 1, 3, 4, 7 + 9	800	ml/ha

09/05/2019	p	Sprayed Sinconil - Sections 0, 1, 3, 4, 7 + 9	1	lt/ha
13/05/2019	f	Applied Nitram (3rd split) - to strips 19, 18, 17 + 12	139	kg/ha
27/06/2019	p	Sprayed Clayton Tebuconazole - Sections 0, 1, 3, 4, 7, 8 + 9	500	ml/ha
27/06/2019	p	Sprayed Vortex - Sections 0, 1, 3, 4, 7, 8 + 9	1.25	lt/ha
26/08/2019	a	Harvested All Plots - Sections 0, 1, 3, 4, 5, 6, 7, 8, 9	-	-

W OATS

17/09/2018	f	Applied FYM - to Strip 2.1 and 2.2 excluding Section 2	35	t /ha
03/10/2018	s	Drilled Mascani, trt. beret gold - Section 5	350	seed/m^2
26/11/2018	p	Sprayed Hallmark - not Section 2	5	ml/ha
15/04/2019	f	Applied Nitram - Strip 6 - section 5 only (0.5 normal rate)	35	kg/ha
15/04/2019	f	Applied Nitram - Strip 7 - section 5 only (0.5 normal rate)	69.5	kg/ha
15/04/2019	f	Applied Nitram - Strip 2.1, 8 - section 5 only (0.5 normal rate)	104.5	kg/ha
15/04/2019	f	Applied Nitram - Strip 9, 10, 11, 13, 14, 18 - section 5 only (0.5 normal rate)	139	kg/ha
15/04/2019	f	Applied Nitram - Strip 12, 15 - section 5 only (0.5 normal rate)	174	kg/ha
15/04/2019	f	Applied Nitram - Strip 16, 17 - section 5 only (0.5 normal rate)	208.5	kg/ha
16/05/2019	p	Sprayed Refine Max - Section 5	75	gm/ha
16/05/2019	p	Sprayed Stefes 720 - Section 5	2	lt/ha
16/05/2019	p	Sprayed Starane Hi - Section 5	400	ml/ha
16/05/2019	p	Sprayed Envoy - Section 5	1	lt/ha
26/08/2019	a	Harvested All Plots - Sections 0, 1, 3, 4, 5, 6, 7, 8, 9	-	-
10/09/2019	a	Harvested Commercial Area - Section 5	-	-

W BEANS

03/10/2018	s	Drilled Tundra - Section 2	35	seed/m^2
10/10/2018	p	Sprayed Kerb Flo 500 - Section 2	1.7	lt/ha
10/10/2018	p	Sprayed Stomp Aqua - Section 2	2.9	lt/ha
21/02/2019	p	Sprayed Crawler - Section 2	3	kg/ha
13/05/2019	p	Sprayed SAN703 - Section 2	1.5	lt/ha
13/05/2019	p	Sprayed Hallmark - Section 2	75	ml/ha
02/07/2019	p	Sprayed Aphox - Section 2	280	gm/ha
02/07/2019	p	Sprayed San703 - Section 2	2	lt/ha
30/08/2019	a	Harvested all plots - Section 2	-	-

WILDERNESS

07/01/2019	a	Topped middle and northern sections	-	-
01/04/2019	a	Topped middle block	-	-

NOTE: Samples of grain and straw were taken for chemical analysis. Unground grain and straw samples from selected treatments were archived.

YIELDS

WINTER WHEAT

Grain Tonnes/Hectare (85% DM)

Tables of means

SECTION PLOT	4/W1	7/W1	3/W2	6/W42	0/W15	1/W53	9/W61	8/W3	Mean
01(FYM)N4	-	10.42	10.35	7.58	-	-	-	-	9.45
21FYMN3	11.24	11.43	12.04	8.12	9.97	11.43	10.13	1.82	9.52
22FYM	6.46	9.59	8.05	7.11	5.87	7.13	6.77	2.51	6.69
03Nil	1.15	1.70	1.39	1.20	0.94	1.07	0.54	1.11	1.14
05(P)KMg	1.57	3.76	1.77	1.35	1.63	1.50	1.39	1.56	1.82
06N1(P)KMg	3.95	5.80	4.29	2.73	3.56	3.30	3.26	1.66	3.57
07N2(P)KMg	6.52	7.14	6.10	4.04	3.63	4.29	4.61	1.91	4.78
08N3(P)KMg	7.68	8.10	7.11	4.28	5.73	4.96	5.36	2.67	5.74
09N4(P)KMg	8.91	9.79	8.95	5.66	6.98	6.95	6.23	2.11	6.95
10N4	4.20	6.97	5.27	2.21	1.92	1.92	1.82	1.05	3.17
11N4PMg	7.97	8.54	6.99	4.15	7.52	6.10	6.11	1.76	6.14
12N1+3+1(P)KMg	9.67	9.87	9.51	5.91	8.24	7.99	8.11	1.96	7.66
13N4PK	9.09	9.28	8.53	5.87	7.18	6.09	7.35	2.18	6.94
14N4PK*(Mg*)	8.77	8.95	8.20	6.82	6.35	6.76	7.31	3.97	7.14
15N5(P)KMg	10.65	9.52	9.85	6.61	8.22	7.74	6.84	1.93	7.67
16N6(P)KMg	8.04	9.12	7.97	7.60	8.86	8.09	7.16	1.80	7.33
17N1+4+1PKMg	10.46	10.91	10.71	7.89	9.55	9.32	9.36	0.76	8.62
18N1+2+1PKMg	8.90	10.2	9.40	7.29	7.81	7.12	7.92	2.21	7.61
19N1+1+1KMg	7.40	9.02	7.55	6.23	6.84	5.50	6.93	2.81	6.54
20N4KMg	-	-	-	-	1.94	1.01	-	-	1.48
Mean	7.37	8.43	7.58	5.40	5.93	5.70	5.96	1.99	6.06
Grain Mean DM%	90.20								

Straw Tonnes/Hectare

Tables of means

SECTION PLOT	4/W1	7/W1	3/W2	6/W42	0/W15	1/W53	9/W61	8/W3	Mean
01(FYM)N4	2.98	3.44	-	-	-	-	-	-	3.21
21FYMN3	4.10	5.40	-	-	-	5.22	-	5.08	4.95
22FYM	1.84	3.74	-	-	-	3.16	-	4.00	3.18
03Nil	0.06	0.04	-	-	-	0.14	-	0.01	0.06
05(P)KMg	0.06	0.55	-	-	-	0.33	-	1.61	0.64
06N1(P)KMg	0.56	1.10	-	-	-	0.81	-	1.74	1.05
07N2(P)KMg	1.00	1.13	-	-	-	1.05	-	1.72	1.22
08N3(P)KMg	1.10	1.59	-	-	-	1.53	-	2.40	1.66
09N4(P)KMg	1.56	2.55	-	-	-	1.88	-	3.02	2.25
10N4	0.56	1.20	-	-	-	0.70	-	0.53	0.75
11N4PMg	1.47	1.72	-	-	-	1.62	-	2.60	1.85
12N1+3+1(P)KMg	2.30	2.88	-	-	-	2.74	-	3.64	2.89
13N4PK	1.77	1.87	-	-	-	1.64	-	2.79	2.02
14N4PK-(Mg-)	1.64	1.91	-	-	-	2.15	-	2.75	2.11
15N5(P)KMg	2.86	1.88	-	-	-	2.61	-	2.99	2.59
16N6(P)KMg	2.33	2.62	-	-	-	2.85	-	3.44	2.81
17N1+4+1PKMg	2.63	2.69	-	-	-	3.35	-	3.15	2.96
18N1+2+1PKMg	1.65	2.78	-	-	-	1.53	-	3.61	2.39
19N1+1+1KMg	1.78	2.51	-	-	-	1.40	-	2.93	2.16
20N4KMg	-	-	-	-	-	0.11	-	-	0.11
Mean	1.70	2.19	-	-	-	1.83	-	2.67	2.09

Straw Mean DM% 90.10

WINTER OAT

Tonnes/Hectare (85% DM)

Table of means

Plot	Treatment	Grain	Straw
15	01 (FYM) 1/2N4	7.69	3.78
215	21 FYM 1/2N3	7.52	5.67
225	22 FYM	5.67	2.85
35	03 Nil	1.41	0.23
55	05 (P)KMg	1.51	0.30
65	06 1/2N1 (P)KMg	3.23	0.43
75	07 1/2N2 (P)KMg	4.67	0.94
85	08 1/2N3 (P)KMg	6.09	1.52
95	09 1/2N4 (P)KMg	7.59	2.40
105	10 1/2N4	6.01	1.39
115	11 1/2N4 PMg	8.05	2.92
125	12 1/2N5 (P)KMg	8.10	2.97
135	13 1/2N4 PK	7.47	2.50

145	14 1/2N4 PK*(Mg*)	7.10	2.25
155	15 1/2N5 (P)KMg	8.51	3.29
165	16 1/2 N6 (P)KMg	8.60	3.68
175	17 1/2N6 PKMg	8.62	3.79
185	18 1/2N4 PKMg	7.29	2.22
195	19 1/2N3 KMg	6.39	1.85
	Mean	6.40	2.37
Plot Area Harvested	0.00463		

WINTER BEANS

TONNES/HECTARE (85% DM)

Tables of means

Plot	Treatment	Grain	Straw
12	01 (FYM) [N4]	3.12	3.03
212	21 [FYMN3]	3.08	5.17
222	22 [FYM]	2.99	5.25
32	03 Nil	0.67	0.07
52	05 (P)KMg	2.90	2.02
62	06 [N1] (P)KMg	3.64	2.79
72	07 [N2] (P)KMg	3.72	2.65
82	08 [N3] (P)KMg	3.19	2.84
92	09 [N4] (P)KMg	2.80	2.12
102	10 [N4]	0.40	0.06
112	11 [N4] PMg	0.03	0.00
122	12 [N1+3+1] (P)KMg	3.05	2.52
132	13 [N4] PK	3.33	3.01
142	14 [N4] PK*(Mg*)	2.68	2.75
152	15 [N5] (P)KMg	3.37	2.74
162	16 [N6] (P)KMg	3.40	2.83
172	17 [N1+4+1] PKMg	2.96	3.39
182	18 [N1+2+1] PKMg	3.37	2.66
192	19 [N1+1+1] KMg	2.03	1.73
	MEAN	2.67	2.64
Mean DM%		87.10	94.00
PLOT AREA HARVESTED		0.00453	

Section 8 Wheat Yields: Clean Grain (2.0-3.5mm), Tonnes/Hectare, after removing weed seed

YEAR	2019
SECTION	8/W3
PLOT	
2.1 FYMN3	1.70
2.2 FYM	2.35
03 Nil	1.03
05 (P)KMg	1.24
06 N1(P)KMg	1.45
07 N2(P)KMg	1.76
08 N3(P)KMg	2.49
09 N4(P)KMg	1.89
10 N4	0.95
11 N4PMg	1.62
12 N1+3+1(P)K2Mg2	1.77
13 N4PK	1.99
14 N4PK*(Mg*)	3.62
15 N5(P)KMg	1.72
16 N6(P)KMg	1.65
17 N1+4+1PKMg	0.65
18 N1+2+1PKMg	2.06
19 N1+1+1KMg	2.67
Mean	1.81

Note: All clean grain yields for section 8 are reported for the 2 - 3.5mm grain size fraction, excluding grain <2mm, as was the practice prior to 2012.