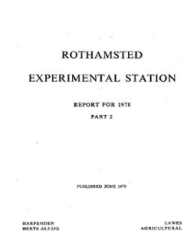


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Rothamsted Experimental Station Report for 1978 Part 2



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Use of Fertilisers in England and Wales, 1978

B. M. Church

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B. M. CHURCH

Continuing the series of annual surveys done by ADAS Soil Scientists and representatives of the Fertiliser Manufacturers' Association in collaboration with the Statistics Department, Rothamsted (Church & Webber, 1971; Church & Lewis, 1977) a representative sample of 1350 farms was surveyed in England and Wales during 1978.

The results (Table 1) show small increases in use of N, P and K per hectare crops and grass since 1977 but these are of the same order as their sampling errors. There is a suggestion that the difference between average N use on leys and on permanent grass has decreased, but the estimated average increase in N use on grassland as a whole (about 3 kg ha⁻¹) is also small in relation to sampling errors. Results for earlier years are omitted from Table 1 because due to a change in sampling frame they are not, as was supposed when they were reported last year, directly comparable with those for 1977 onwards.

As in 1977, there was evidence of a continuing increase in N use on tillage crops which was especially notable on winter wheat (Table 2). Average applications on winter wheat in 1978 were 125 kg ha⁻¹ N and nearly a third of the crop had more than 150 kg ha⁻¹. Much winter wheat is grown in medium or heavy soils (Elliott, Church *et al.* 1979) and an appreciable area of the crop must be getting more N than currently recommended (MAFF, 1979). New varieties may respond to heavier N applications and it is not easy for well-based objective advice to be also up-to-date; however, occasional recorded applications of 250 kg ha⁻¹ or more (excluded from the summary tables) indicate that N is sometimes inefficiently or extravagantly used on what is currently a high value crop known to respond well.

TABLE 1. Fertiliser use on tillage, leys and permanent grass, 1977-78 (kg ha⁻¹)

	Tillage			Leys			P.G.*			All crops and grass		
	N	P ₂ O ₅	K ₂ O	N	P ₂ O ₅	K ₂ O	N	P ₂ O ₅	K ₂ O	N	P ₂ O ₅	K ₂ O
1977	100	49	56	166	33	32	88	21	16	111	37	39
1978	105	51	56	161	34	34	96	23	19	114	39	41

* Includes grass seeded more than 7 years ago

TABLE 2. Fertiliser use on winter wheat (kg ha⁻¹), 1975-78

N				P ₂ O ₅				K ₂ O			
1975	1976	1977	1978	1975	1976	1977	1978	1975	1976	1977	1978
93	102	115	125	39	42	40	44	33	33	33	37

Estimates of average fertiliser use per hectare for individual crops, and of the proportions of crop area getting different amounts of nutrient, are given in Tables 3-6. Table 7 gives data for grassland classified by years since seeded down which may be useful in conjunction with census data.

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TABLE 3
Fertiliser use in England and Wales, 1978

Fields	Hectares ('000)	Overall* (kg ha ⁻¹)			% Area receiving			Actual* (kg ha ⁻¹)		
		N	P ₂ O ₅	K ₂ O	N	P	K	N	P ₂ O ₅	K ₂ O
Spring wheat	129	41	87	26	88	67	65	99	39	39
Winter wheat	2179	992	125	44	98	83	75	128	54	49
Spring barley	2787	1238	83	38	99	96	94	84	39	41
Winter barley	801	333	106	46	100	91	85	106	51	50
Spring oats	150	35	63	41	90	91	88	70	45	40
Winter oats	225	68	82	49	98	94	91	84	52	49
Mixed corn	22	10	47	35	98	95	95	48	36	43
Rye	35	10	80	24	86	56	61	92	42	61
Maize	25	8	131	60	100	96	90	131	62	61
Early potatoes	116	29	165	175	100	100	100	165	176	203
Maincrop potatoes	415	116	186	193	99	99	99	188	194	254
Sugar beet	436	179	147	76	99	99	100	149	77	161
Swedes (stock)	110	19	56	129	88	96	89	64	134	83
Turnips (stock)	73	18	72	49	96	68	68	75	73	70
Mangolds	30	2	149	93	90	87	87	166	107	145
Kale and cow cabbage	204	40	107	50	91	78	77	117	63	64
Rape (stock)	68	17	83	88	92	90	86	90	97	60
Beans (stock)	116	33	5	23	14	42	38	40	53	61
Mixed roots and green crops	61	15	87	79	96	86	86	91	91	86
Peas—vinning	93	45	9	20	26	39	42	35	52	59
Peas—harvested dry	90	30	4	27	23	59	55	19	47	55
Broad beans	28	9	30	61	76	88	88	39	70	90
Runner beans	22	2	118	91	98	100	100	120	91	105
French beans	31	8	126	78	75	74	69	168	106	103
Beans—other	20	5	15	30	34	43	43	42	70	70
Brussels sprouts	76	12	242	108	99	99	99	245	109	217
Cabbage	95	14	136	57	82	69	72	166	82	128
Cauliflower	70	10	156	100	98	90	94	159	110	185
Carrots	32	13	53	82	82	82	82	65	101	107
Onions	67	9	127	108	99	89	91	128	121	208
Lettuce	23	2	123	82	100	91	100	123	89	106
Oilseed rape	107	60	234	51	100	84	66	234	61	60
Forage maize	42	12	122	52	99	92	92	123	57	61
Arable silage	24	6	81	35	97	91	89	84	38	35
All tillage	9383	3563	105	51	94	88	84	112	58	67
One year leys	49	15	123	28	93	60	59	133	47	54
Two to seven year leys	3441	1542	161	34	93	69	68	173	50	50
Permanent grass	3455	2152	96	23	76	53	51	127	44	38
All crops and grass	16328	7271	114	39	88	73	71	129	53	57

* The average application of any fertiliser component over all fields, including those receiving none, is termed 'overall'. The average excluding fields with none of the component is termed 'actual'.

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TABLE 4

Percentages of crop area getting different amounts of N (kg ha⁻¹)

	Fields	0	<25	25—	50—	75—	100—	125—	150—	200—	250—	300—	400+
Spring wheat	129	12	1	5	18	25	11	22	7	0	0	0	0
Winter wheat	2179	2	1	2	5	15	19	28	24	4	0	0	0
Spring barley	2787	1	1	5	24	40	17	9	2	0	0	0	0
Winter barley	801	0	3	3	9	21	33	23	8	0	0	0	0
Spring oats	150	10	2	9	40	29	7	1	2	0	0	0	0
Winter oats	225	2	4	9	22	33	18	7	3	1	0	0	0
Mixed corn	22	2	3	30	50	15	0	0	0	0	0	0	0
Rye	35	14	5	1	34	2	14	29	1	0	0	0	0
Maize	25	0	2	4	8	9	26	22	14	4	11	0	0
Early potatoes	116	0	1	1	3	4	6	12	60	13	0	0	0
Maincrop potatoes	415	1	0	0	1	2	5	6	51	23	7	3	0
Sugar beet	436	1	0	0	3	3	14	34	34	7	2	2	0
Swedes (stock)	110	12	5	29	22	20	6	4	1	1	0	0	0
Turnips (stock)	73	4	2	25	12	36	14	3	4	0	0	0	0
Mangolds	30	10	0	0	1	8	2	46	17	2	8	6	0
Kale and cow cabbage	204	9	0	3	10	27	13	20	11	5	2	1	0
Rape (stock)	68	8	0	4	29	32	9	8	8	0	2	0	0
Beans (stock)	116	86	6	3	2	1	0	0	0	0	0	0	0
Mixed roots and green crops	61	4	0	14	20	30	15	7	6	1	1	1	0
Peas—vining	93	74	12	8	4	1	1	0	0	0	0	0	0
Peas—harvested dry	90	77	21	2	0	0	0	0	0	0	0	0	0
Broad beans	28	24	23	34	16	2	0	0	0	0	0	0	0
Runner beans	22	2	7	0	16	21	7	1	45	2	0	0	0
French beans	31	25	0	0	0	3	4	17	44	7	0	0	0
Beans—other	20	66	5	13	16	0	0	0	0	0	0	0	0
Brussels sprouts	76	1	0	0	1	12	0	8	8	16	23	26	4
Cabbage	95	18	0	5	3	6	21	6	17	4	13	5	1
Cauliflower	70	2	0	1	4	31	2	5	32	6	12	5	0
Carrots	32	18	0	20	44	9	6	2	0	0	0	0	0
Onions	67	1	3	2	12	30	13	1	22	10	6	2	0
Lettuce	23	0	0	3	8	24	4	52	4	1	4	0	0
Oilseed rape	107	0	0	0	6	3	4	0	7	25	46	9	0
Forage maize	42	1	0	1	6	25	15	30	17	5	0	0	0
Arable silage	24	3	5	7	40	11	14	13	6	0	2	0	0
All tillage	9383	6	2	4	13	23	17	16	13	3	2	0	0
One year leys	49	7	6	3	15	26	2	15	11	2	1	11	1
Two to seven year leys	3441	7	0	5	11	12	8	8	15	11	9	11	2
Permanent grass	3455	24	1	9	19	12	5	7	8	5	3	5	1
All crops and grass	16328	12	1	6	15	18	11	12	12	5	4	4	1

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TABLE 5
Percentages of crop area getting different amounts of P_2O_5 ($kg\ ha^{-1}$)

	Fields	0	<25	25—	50—	75—	100—	125—	150—	200—	250—	300—	400+
Spring wheat	129	33	6	47	11	1	0	0	1	0	0	0	0
Winter wheat	2179	17	3	33	38	6	1	1	0	0	0	0	0
Spring barley	2787	4	9	69	16	1	0	0	0	0	0	0	0
Winter barley	801	9	4	42	38	6	0	1	0	0	0	0	0
Spring oats	150	9	8	62	16	1	0	0	1	1	0	0	0
Winter oats	225	6	4	41	38	10	0	0	1	0	0	0	0
Mixed corn	22	5	12	59	20	4	0	0	0	0	0	0	0
Rye	35	44	7	23	26	0	0	0	0	0	0	0	0
Maize	25	4	0	23	45	22	5	2	0	0	0	0	0
Early potatoes	116	0	1	1	3	3	8	11	55	13	1	2	2
Maincrop potatoes	415	1	0	1	1	1	4	8	48	24	7	5	0
Sugar beet	436	1	1	13	44	22	10	5	3	1	0	0	0
Swedes (stock)	110	4	3	7	14	21	10	6	8	17	10	1	0
Turnips (stock)	73	32	6	18	12	17	5	3	5	1	0	0	0
Mangolds	30	13	0	16	30	18	8	3	3	16	0	4	0
Kale and cow cabbage	204	22	4	23	26	18	3	1	1	1	0	0	0
Rape (stock)	68	10	0	38	11	5	5	5	6	16	2	0	0
Beans (stock)	116	58	1	11	25	5	0	0	2	0	0	0	0
Mixed roots and green crops	61	14	4	24	11	26	3	3	0	8	5	0	0
Peas—vining	93	61	3	15	14	6	1	0	0	0	0	0	0
Peas—harvested dry	90	41	1	29	28	0	0	0	0	0	0	0	0
Broad beans	28	12	19	25	25	4	0	0	0	15	0	0	0
Runner beans	22	0	6	4	6	57	8	4	14	1	0	0	0
French beans	31	26	0	0	18	17	19	15	0	5	0	0	0
Beans—other	20	57	0	3	20	19	0	0	0	0	0	0	0
Brussels sprouts	76	1	0	7	12	35	15	7	16	6	0	0	0
Cabbage	95	31	0	10	23	18	8	5	4	1	0	0	0
Cauliflower	70	10	0	18	7	28	1	12	19	1	5	0	0
Carrots	32	18	0	2	8	35	21	5	8	2	3	0	0
Onions	67	11	3	5	3	25	20	4	23	4	0	0	0
Lettuce	23	9	0	6	55	15	4	5	0	0	6	0	0
Oilseed rape	107	16	3	11	52	12	1	3	1	0	0	0	0
Forage maize	42	8	0	31	44	10	6	0	0	0	0	0	0
Arable silage	24	9	20	52	9	8	0	2	0	0	0	0	0
All tillage	9383	12	5	43	26	6	2	1	3	1	0	0	0
One year leys	49	40	2	34	18	0	4	0	1	0	0	0	0
Two to seven year leys	3441	31	14	33	12	3	2	1	3	1	1	0	0
Permanent grass	3455	47	15	25	7	2	1	1	2	1	0	0	0
All crops and grass	16328	27	10	35	18	4	1	1	3	1	0	0	0

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TABLE 6
Percentages of crop area getting different amounts of K_2O ($kg\ ha^{-1}$)

	Fields	0	<25	25—	50—	75—	100—	125—	150—	200—	250—	300—	400+
Spring wheat	129	35	5	46	12	2	1	0	0	0	0	0	0
Winter wheat	2179	25	3	37	29	5	1	0	0	0	0	0	0
Spring barley	2787	6	5	66	21	2	0	0	0	0	0	0	0
Winter barley	801	15	3	43	30	7	3	0	0	0	0	0	0
Spring oats	150	12	6	63	17	2	0	0	0	0	0	0	0
Winter oats	225	9	4	44	35	7	1	0	0	0	0	0	0
Mixed corn	22	5	12	52	16	12	0	0	3	0	0	0	0
Rye	35	39	2	25	28	0	0	0	0	6	0	0	0
Maize	25	10	0	20	46	16	5	0	2	0	0	0	0
Early potatoes	116	0	1	0	3	5	3	7	30	14	30	7	0
Maincrop potatoes	415	1	0	1	0	0	3	4	12	21	33	22	4
Sugar beet	436	0	0	3	7	12	11	7	31	20	4	4	0
Swedes (stock)	110	11	3	8	27	20	17	11	2	0	0	0	0
Turnips (stock)	73	32	6	9	27	14	6	3	4	0	0	0	0
Mangolds	30	13	0	12	7	11	9	2	17	23	2	4	0
Kale and cow cabbage	204	23	1	22	29	16	6	2	2	0	0	0	0
Rape (stock)	68	14	0	45	23	1	10	2	2	0	0	0	0
Beans (stock)	116	62	1	9	21	5	0	0	1	0	1	0	0
Mixed roots and green crops	61	14	4	16	20	23	6	4	9	1	2	0	0
Peas—vining	93	58	0	13	17	8	3	0	0	0	0	0	0
Peas—harvested dry	90	45	1	15	36	2	0	0	1	0	0	0	0
Broad beans	28	12	0	1	60	2	0	0	24	0	0	0	0
Runner beans	22	0	5	1	8	39	22	2	18	0	4	0	0
French beans	31	31	0	0	34	5	8	8	6	7	0	0	0
Beans—other	20	57	0	3	20	19	0	0	0	0	0	0	0
Brussels sprouts	76	1	0	0	3	4	3	7	19	18	39	6	0
Cabbage	95	28	0	8	9	7	11	11	16	6	3	1	0
Cauliflower	70	6	0	0	10	2	11	6	12	27	26	0	0
Carrots	32	18	0	0	12	35	4	6	21	2	1	0	0
Onions	67	9	0	0	11	1	11	7	6	15	17	22	0
Lettuce	23	0	0	0	60	11	1	7	4	5	11	0	0
Oilseed rape	107	34	2	12	39	9	4	1	0	0	0	0	0
Forage maize	42	8	0	28	45	12	1	0	5	0	0	0	0
Arable silage	24	11	14	59	9	6	0	0	0	0	0	0	0
All tillage	9383	16	3	41	23	5	2	1	3	2	2	1	0
One year leys	49	41	2	33	13	1	8	1	1	0	0	0	0
Two to seven year leys	3441	32	11	30	14	6	3	2	1	0	0	0	0
Permanent grass	3455	49	13	24	10	3	1	0	0	0	0	0	0
All crops and grass	16328	29	8	34	17	4	2	1	2	1	1	1	0

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TABLE 7
Fertiliser use on grassland by years since seeded

	Fields	Hectares ('000)	Overall* (kg ha ⁻¹)			% Area receiving				Actual* (kg ha ⁻¹)		
			N	P ₂ O ₅	K ₂ O	N	P	K	FYM	N	P ₂ O ₅	K ₂ O
1 year leys	49	15	123	28	32	93	60	59	34	133	47	54
Other grassland												
First year	823	290	139	44	36	93	73	69	28	149	60	51
Second year	763	287	181	34	38	95	66	67	41	191	51	57
One or two years	1586	577	160	39	37	94	70	68	34	170	56	54
Third year	612	303	174	34	37	96	70	69	46	182	48	53
Fourth year	441	223	162	31	29	91	68	65	50	178	45	45
Fifth year	365	215	156	28	36	94	74	75	52	165	38	48
Three to five years	1418	740	165	31	34	94	70	70	49	176	44	49
One to five years	3004	1317	163	35	35	94	70	69	43	173	49	51
Six to seven years	414	220	154	32	26	88	63	61	49	175	51	42
Over five years	3869	2372	102	24	20	77	54	52	35	132	45	39
One to seven years	3418	1536	161	34	34	93	69	68	44	174	49	50
Over seven years	3455	2152	96	23	19	76	53	51	33	127	44	38
All grassland	6922	3703	123	28	26	83	60	58	38	149	47	44

* The average application of any fertiliser component over all fields, including those receiving none, is termed 'overall'. The average excluding fields with none of the component is termed 'actual'.