

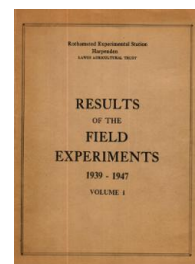
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# Yields of the Field Experiments 1939-1947 Volume 1

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## BA/1 Two-course Rotation

### Rothamsted Research

Rothamsted Research (1948) *BA/1 Two-course Rotation* ; Yields Of The Field Experiments 1939-1947 Volume 1, pp 58 - 67 - DOI: <https://doi.org/10.23637/ERADOC-1-145>

TWO COURSE ROTATION EXPERIMENT

Long Hoos (begun in 1942)

Cumulative Effects of Agricultural Salt

The experiment was designed to test the cumulative effects of agricultural salt and muriate of potash, and to compare two methods of application of the salt.

The rotation is 1st year Sugar beet, 2nd year Barley.

There are 2 series (one for each crop in any particular year), each consisting of 4 blocks of 12 plots each. Area of each plot in acres:

Series	Total	Sugar Beet	
		Harvested	
			Barley
1	0.0219	0.0190	0.0207
2	0.0200	0.0173	0.0189

Treatments: all combinations of

- (1) Agricultural salt (rates for sugar beet): None (0),  $2\frac{1}{2}$  cwt. (Na 1), 5 cwt. (Na 2) and  $7\frac{1}{2}$  cwt. (Na 3) per acre.
- (2) Muriate of potash: None (0), the equivalent of half the single dressing of salt (K1) (approximately 1 cwt.  $K_2O$  per acre), the equivalent of the double dressing of salt (K2), applied to sugar beet at sowing.
- (3) Time of application of salt: in seed bed before sowing (A), before ploughing during the winter (B).
- (4) Salt applied to sugar beet only (0), salt repeated at half rate on barley (R).

The following interactions are partially confounded with block differences:-

(A-B) x R; (3-2+1-0) Na x (A-B); (3-2+1-0) Na x R;

and the interactions of these with K.

Basal dressings, applied to all plots at sowing:

Barley: 0.3 cwt. N per acre as sulphate of ammonia  
 Sugar beet: 0.8 cwt. N per acre as sulphate of ammonia  
 0.6 cwt.  $P_2O_5$  per acre as superphosphate.

Crop Notes

	Sugar beet: Klein E		Barley: Plumage Archer	
	Sown	Lifted	Sown	Harvested
1942	April 25	Dec. 2	(Series 2 grew preliminary wheat)	
1943	April 14	Nov. 12	March 13	Aug. 10
1944	April 22	Oct. 26, Nov. 23	March 8	Aug. 10
1945	April 12	Nov. 5	March 27	Aug. 8
1946	April 15	Nov. 22	March 21	Aug. 14
1947	April 25	Oct. 30	April 11	Aug. 11

Ba/1.2

In 1942, 1943, samples were taken at intervals from one end of each plot for physiological and chemical study. The yields given are corrected for the reduced area per plot. In 1944, 12 of the 48 plots of sugar beet were lifted Oct. 26th. This had an appreciable effect on tops and sugar percentage, which have been adjusted by means of a regression. There was no effect on the other results.

2

Ba/1.3

Two Course Rotation Experiment

		Sugar Beet					Year	
		Salt cwt.	1942	1943	1944	1945	1946	1947
		Roots (washed): tons per acre						
Muriate of potash K <sub>2</sub> O cwt. per acre	0.0	0	14.98	15.46	8.51	16.18	15.34	5.92
		2.5	16.95	17.60	10.96	17.96	17.71	9.04
		5.0 (a)	17.12	17.63	10.61	17.15	16.86	9.33
		7.5	16.72	16.68	9.69	16.86	16.32	9.23
		Mean (b)	16.44	16.84	9.94	17.04	16.56	8.38
	1.0	0	14.73	16.97	8.04	16.97	15.19	7.48
		2.5	16.08	17.03	11.25	16.88	17.08	8.50
		5.0 (a)	16.86	17.12	10.53	17.34	17.61	9.99
		7.5	17.61	16.08	11.34	16.39	17.16	9.74
		Mean (b)	16.32	16.80	10.29	16.90	16.76	8.93
	2.0	0	15.68	16.87	9.34	16.57	16.93	7.54
		2.5	16.28	16.45	10.96	17.12	17.56	8.72
		5.0 (a)	16.65	16.91	10.28	17.55	17.21	9.26
		7.5	17.28	16.87	11.24	16.21	17.02	10.20
		Mean (b)	16.47	16.78	10.46	16.86	17.18	8.93
Salt applied Winter	2.5	16.04	17.43	10.71	17.27	17.66	8.60	
	5.0 (d)	16.58	17.32	10.09	17.21	17.35	9.59	
	7.5	17.10	16.23	11.10	16.63	16.24	10.08	
	Mean (e)	16.57	16.99	10.63	17.04	17.08	9.42	
In seed bed	2.5	16.83	16.62	11.40	17.37	17.24	8.91	
	5.0 (d)	17.17	17.12	10.86	17.48	17.11	9.47	
	7.5	17.31	16.86	10.41	16.35	17.43	9.36	
	Mean (e)	17.10	16.87	10.89	17.07	17.26	9.25	
Mean	0	15.13	16.43	8.63	16.57	15.82	6.98	
	2.5	16.44	17.03	11.06	17.32	17.45	8.75	
	5.0 (c)	16.88	17.22	10.47	17.35	17.23	9.53	
	7.5	17.20	16.54	10.76	16.49	16.83	9.72	
	Mean	16.41	16.81	10.23	16.93	16.83	8.74	
Standard errors (28 d.f. in 1942, 22 d.f. in other years)	(a)	0.517	0.577	0.503	0.384	0.427		
	(b)	0.259	0.289	0.251	0.192	0.213		
	(c)	0.299	0.333	0.290	0.222	0.247		
	(d)	0.395	0.441	0.384	0.294	0.326		
	(e)	0.239	0.266	0.232	0.177	0.197		
	Per plot %age	1.035	1.154	1.005	0.769	0.854		

B/L.4

Sugar Beet

	Salt cwt. per acre	Year					
		1942	1943	1944	1945	1946	1947
Muriate of potash K <sub>2</sub> O cwt. per acre		Sugar Percentage					
0.0	0	18.19	18.44	16.24	18.03	17.04	19.34
	2.5	18.02	18.84	16.93	18.47	17.04	20.42
	5.0 (a)	18.54	18.85	17.02	18.81	17.14	21.07
	7.5	18.31	18.81	16.60	18.57	17.18	20.40
	Mean (b)	18.27	18.74	16.70	18.47	17.10	20.31
	0	18.19	18.48	16.62	18.49	16.96	20.86
1.0	2.5	18.30	18.97	16.84	18.46	16.79	20.48
	5.0 (a)	18.16	18.72	16.76	18.38	17.29	20.58
	7.5	17.98	18.60	16.66	18.64	17.16	20.54
	Mean (b)	18.16	18.69	16.72	18.49	17.05	20.62
	0	18.26	18.78	16.68	18.57	17.49	20.48
2.0	2.5	18.53	18.83	16.92	18.83	17.38	20.76
	5.0 (a)	18.38	18.84	16.78	18.58	17.21	20.43
	7.5	18.26	18.60	16.89	18.70	16.98	21.03
	Mean (b)	18.35	18.76	16.82	18.67	17.26	20.68
Salt applied Winter	2.5	18.30	19.00	16.85	18.64	17.08	20.33
	5.0 (d)	18.34	18.85	16.72	18.53	17.10	20.76
	7.5	18.08	18.61	16.83	18.63	17.10	20.94
	Mean (e)	18.24	18.82	16.80	18.60	17.09	20.68
In seed bed	2.5	18.27	18.76	16.94	18.53	17.05	20.78
	5.0 (d)	18.37	18.76	16.98	18.65	17.33	20.63
	7.5	18.28	18.73	16.60	18.65	17.12	20.38
	Mean (e)	18.31	18.75	16.84	18.61	17.17	20.60
Mean	0	18.21	18.57	16.51	18.36	17.16	20.23
	2.5	18.28	18.88	16.90	18.59	17.07	20.55
	5.0 (c)	18.36	18.80	16.85	18.59	17.21	20.69
	7.5	18.18	18.67	16.72	18.64	17.11	20.66
	Mean	18.26	18.73	16.74	18.54	17.14	20.54
Standard errors (28 d.f. in 1942, 21 d.f. in 1944, 22 d.f. in other years)	(a)	0.180		0.220	0.165	0.262	
	(b)	0.090		0.110	0.082	0.131	
	(c)	0.104		0.127	0.095	0.151	
	(d)	0.137		0.168	0.126	0.200	
	(e)	0.083		0.102	0.076	0.121	
	Per plot	0.360		0.441	0.329	0.524	

Ba/1.5

Two Course Rotation Experiment

		Sugar Beet						
		Salt	Year					
		cwt. per acre	1942	1943	1944	1945	1946	1947
Muriate of potash K <sub>2</sub> O cwt. per acre	0.0	0	54.5	57.0	27.2	58.3	52.3	23.7
		2.5	61.1	66.3	36.6	66.3	60.2	37.2
		5.0 (a)	63.5	66.5	36.1	64.5	57.9	39.5
		7.5	61.2	62.7	32.2	62.7	56.0	37.9
		Mean (b)	60.1	63.1	33.0	63.0	56.6	34.6
	1.0	0	53.6	62.7	27.1	62.8	51.5	31.3
		2.5	58.8	64.6	37.4	62.3	57.5	35.1
		5.0 (a)	61.2	64.1	35.8	63.8	60.9	41.1
		7.5	63.3	59.8	37.7	61.1	58.8	40.4
		Mean (b)	59.2	62.8	34.5	62.5	57.2	37.0
	2.0	0	57.3	63.3	31.6	61.5	59.2	31.1
		2.5	60.4	62.0	37.1	64.4	61.0	36.5
		5.0 (a)	61.1	63.9	34.5	65.2	59.2	38.4
		7.5	63.1	62.8	37.9	60.6	57.8	42.9
		Mean (b)	60.5	63.0	35.3	62.9	59.3	37.2
	Salt applied Winter	2.5	58.6	66.2	35.8	64.3	60.3	35.4
5.0 (d)		60.8	65.3	34.1	63.9	59.4	40.0	
7.5		61.8	60.3	37.3	61.7	55.5	42.5	
Mean (e)		60.4	63.9	35.7	63.3	58.4	39.3	
In seed bed	2.5	61.6	62.4	38.3	64.4	58.9	37.2	
	5.0 (d)	63.1	64.3	36.9	65.1	59.3	39.4	
	7.5	63.3	63.2	34.6	61.3	59.7	38.3	
	Mean (e)	62.6	63.3	36.6	63.6	59.3	38.3	
Mean	0	55.1	61.0	28.6	60.9	54.3	28.7	
	2.5	60.1	64.3	37.0	64.3	59.6	36.3	
	5.0 (c)	61.9	64.8	35.5	64.5	59.3	39.7	
	7.5	62.5	61.8	35.9	61.5	57.5	40.4	
	Mean	59.9	63.0	34.3	62.8	57.7	36.3	
Standard errors (28 d.f. in 1942, 22 d.f. in other years)	(a)	1.85	2.17	1.74	1.52	1.91	2.50	
	(b)	0.92	1.08	0.87	0.76	0.96	1.25	
	(c)	1.07	1.25	1.00	0.87	1.10	1.44	
	(d)	1.41	1.66	1.32	1.16	1.46	1.91	
	(e)	0.85	1.00	0.80	0.71	0.88	1.15	
	Per plot %age	3.69	4.34	3.47	3.03	3.82	5.00	
		6.2	6.9	10.1	4.8	6.6	13.8	

N

Ba/1. 6

		Sugar Beet							
		Salt cwt. per acre	1942	1943	1944	1945	1946	1947	
		Tops: tons per acre							
Muriate of potash K <sub>2</sub> O cwt. per acre	0		10.06	9.55	10.69	12.20	17.05	4.59	
	2.5		11.23	10.76	13.20	11.82	18.01	6.94	
	0.0	5.0 (a)	10.56	11.55	13.01	11.80	17.71	7.23	
		7.5	11.42	11.60	12.52	12.74	17.21	7.01	
		Mean (b)	10.82	10.86	12.36	12.14	17.50	6.44	
	1.0	0		10.41	10.62	12.40	11.89	17.73	5.81
		2.5		12.19	11.10	13.80	13.58	17.73	6.40
			5.0 (a)	10.20	10.50	11.98	12.43	16.65	7.66
			7.5	13.30	10.74	14.27	12.20	18.18	7.26
			Mean (b)	11.53	10.74	13.11	12.52	17.57	6.78
	2.0	0		10.43	10.24	11.70	11.76	17.31	5.83
		2.5		11.74	10.17	12.06	12.05	16.93	6.59
			5.0 (a)	11.42	10.34	11.49	11.49	17.07	7.30
			7.5	11.77	11.12	12.63	11.45	16.49	7.48
			Mean (b)	11.34	10.47	11.97	11.69	16.95	6.80
Salt applied Winter	2.5		11.55	10.49	12.69	12.08	17.83	6.63	
		5.0 (d)	10.58	10.80	12.47	11.62	17.54	7.52	
		7.5	12.17	11.06	13.89	11.91	17.48	7.62	
		Mean (e)	11.43	10.78	13.02	11.87	17.62	7.26	
In seed bed	2.5		11.88	10.87	13.34	12.89	17.29	6.65	
		5.0 (d)	10.87	10.79	11.86	12.19	16.75	7.27	
		7.5	12.17	11.25	12.39	12.35	17.10	6.88	
		Mean (e)	11.64	10.97	12.53	12.48	17.05	6.93	
Mean	0		10.30	10.14	11.59	11.95	17.36	5.41	
		2.5 (c)	11.72	10.68	13.02	12.48	17.56	6.64	
		5.0	10.73	10.80	12.16	11.91	17.14	7.40	
		7.5	12.17	11.15	13.14	12.13	17.29	7.25	
		Mean	11.23	10.69	12.48	12.12	17.34	6.68	
Standard errors (28 d.f. in 1942, 21 d.f. in 1944, 22 d.f. in other years)	(a)		0.569	0.600	0.680	0.382	0.813	0.353	
	(b)		0.334	0.300	0.340	0.191	0.407	0.177	
	(c)		0.386	0.346	0.392	0.221	0.470	0.204	
	(d)		0.511	0.458	0.519	0.292	0.621	0.270	
	(e)		0.309	0.277	0.314	0.176	0.375	0.163	
	Per plot %age		1.338	1.200	1.359	0.764	1.627	0.707	
		11.9	11.2	10.9	6.3	9.4	10.6		

Two Course Rotation Experiment

Ba/1.7



		Sugar Beet						
		Salt cwt. per acre	1942	1943	1944	1945	1946 <sup>‡</sup>	1947
		Plant Number: thousands per acre						
Muriate of potash K <sub>2</sub> O cwt. per acre	0		25.9	23.5	27.7	27.6		16.3
	2.5		25.3	25.6	29.1	28.5		19.5
	5.0 (a)		26.0	25.3	27.8	28.4		19.1
	7.5		26.3	24.5	24.6	28.1		19.1
	Mean (b)		25.9	24.7	27.3	28.2		18.5
1.0	0		25.2	23.9	27.9	28.3		19.2
	2.5		23.4	24.5	27.7	27.7		19.7
	5.0 (a)		27.4	24.1	29.2	28.6		21.2
	7.5		27.3	22.6	26.7	27.9		20.6
	Mean (b)		25.8	23.8	27.9	28.1		20.2
2.0	0		24.8	25.1	27.8	28.2		18.1
	2.5		24.5	22.7	27.7	27.9		18.8
	5.0 (a)		27.1	24.0	28.5	27.6		19.7
	7.5		26.5	23.5	27.7	27.0		22.1
	Mean (b)		25.7	23.8	27.9	27.7		19.7
Salt applied Winter	2.5		24.8	24.1	28.3	27.8		18.8
	5.0 (d)		27.3	24.3	28.7	27.8		19.6
	7.5		26.5	23.8	26.2	27.9		21.4
	Mean (e)		26.2	24.1	27.7	27.8		19.9
In seed bed	2.5		24.0	24.4	28.0	28.3		19.8
	5.0 (d)		26.3	24.6	28.4	28.6		20.4
	7.5		26.9	23.2	26.4	27.4		19.8
	Mean (e)		25.7	24.1	27.6	28.1		20.0
Mean	0		25.3	24.1	27.8	28.0		17.9
	2.5		24.4	24.3	28.2	28.0		19.3
	5.0 (c)		26.8	24.5	28.5	28.2		20.0
	7.5		26.7	23.5	26.3	27.7		20.6
	Mean		25.8	24.1	27.7	28.0		19.5
In seed bed	2.5		24.0	24.4	28.0	28.3		19.8
	5.0 (d)		26.3	24.6	28.4	28.6		20.4
	7.5		26.9	23.2	26.4	27.4		19.8
	Mean (e)		25.7	24.1	27.6	28.1		20.0
	Standard errors (28 d.f. in 1942, 22 d.f. in other years)	(a)		0.93	1.00	0.94	0.56	
(b)			0.46	0.50	0.47	0.28		
(c)			0.54	0.58	0.55	0.32		
(d)			0.71	0.76	0.72	0.43		
(e)			0.43	0.46	0.44	0.26		
Per plot %age			1.86	2.00	1.89	1.12		

‡ The plant numbers were not counted in 1946.



Barley

		Salt applied in previous year	1943	1944	1945	1946	1947	
		cwt. per acre						
Muriate of potash applied in previous year K <sub>2</sub> O cwt. per acre	0.0	0	24.0	30.0	27.1	32.6	23.1	
		2.5	24.9	31.1	27.8	31.9	23.9	
		5.0 (a)	23.8	30.2	27.5	33.0	22.1	
		7.5	23.7	29.8	26.5	32.0	21.7	
		Mean (b)	24.1	30.3	27.2	32.4	22.7	
	1.0	0	22.5	30.3	26.4	34.3	23.0	
		2.5	26.9	29.6	29.4	32.7	26.3	
		5.0 (a)	22.7	30.5	26.6	35.5	22.4	
		7.5	26.6	30.1	29.5	32.4	24.7	
		Mean (b)	24.7	30.1	28.0	33.7	24.1	
	2.0	0	23.3	29.4	26.1	32.8	23.7	
		2.5	25.7	30.7	28.0	33.0	24.1	
		5.0 (a)	23.9	29.4	27.2	33.3	22.7	
		7.5	26.4	30.7	29.3	31.9	23.6	
		Mean (b)	24.8	30.0	27.6	32.8	23.5	
Salt in current year	None	2.5	24.4	30.8	27.6	33.2	23.4	
		5.0 (c)	22.7	30.0	26.4	33.4	22.7	
		7.5	26.1	29.8	28.7	31.3	24.5	
		Mean (d)	24.4	30.2	27.6	32.6	23.5	
	Half Rate	2.5	27.3	30.1	29.1	31.9	26.2	
		5.0 (c)	24.2	30.1	27.8	34.5	22.0	
		7.5	25.1	30.5	28.2	32.9	22.2	
		Mean (d)	25.5	30.2	28.4	33.1	23.5	
	Salt applied Winter	Winter	2.5	25.1	30.0	27.9	32.7	25.4
			5.0 (c)	23.2	30.0	26.8	34.3	22.4
7.5			27.2	30.5	29.5	32.4	21.7	
Mean (d)			25.2	30.2	28.1	33.1	23.2	
In seed bed		2.5	26.6	31.0	28.9	32.4	24.2	
		5.0 (c)	23.8	30.1	27.4	33.5	22.3	
		7.5	23.9	29.8	27.4	31.8	25.0	
		Mean (d)	24.8	30.3	27.9	32.6	23.8	
Mean		0	23.3	29.9	26.5	33.2	23.3	
		2.5	25.8	30.5	28.4	32.5	24.8	
	5.0 (e)	23.5	30.0	27.1	33.9	22.4		
	7.5	25.6	30.2	28.4	32.1	23.3		
	Mean	24.5	30.1	27.6	32.9	23.4		
Standard errors (22 d.f.)	(a)	0.92	0.68	0.66	1.43	0.82		
	(b)	0.46	0.34	0.33	0.72	0.41		
	(c)	0.71	0.52	0.50	1.09	0.63		
	(d)	0.43	0.32	0.31	0.66	0.38		
	(e)	0.53	0.40	0.38	0.83	0.47		
	Per plot %age	1.85 7.5	1.37 4.6	1.31 4.8	2.86 8.7	1.64 7.0		

Two Course Rotation Experiment

Ba/1.9

Barley

		Salt applied in previous year	Year				
		cwt. per acre	1943	1944	1945	1946	1947
Muriate of potash applied in previous year K <sub>2</sub> O cwt. per acre	0.0	0	27.9	28.9	31.7	36.5	21.2
		2.5	25.7	28.9	33.0	36.6	22.0
		5.0 (a)	25.8	27.3	32.7	36.3	21.1
		7.5	24.6	28.4	30.2	37.5	20.9
		Mean (b)	26.0	28.4	31.9	36.7	21.3
	1.0	0	23.9	28.9	32.2	36.2	22.2
		2.5	29.4	28.4	34.3	38.3	24.4
		5.0 (a)	24.3	28.4	32.2	39.0	21.8
		7.5	27.6	29.2	34.8	37.3	24.3
		Mean (b)	26.3	28.7	33.4	37.7	23.2
	2.0	0	24.8	27.4	31.0	38.0	22.1
		2.5	27.1	29.0	32.9	37.8	22.7
		5.0 (a)	25.4	27.6	32.8	37.7	21.5
		7.5	27.8	27.6	34.5	38.6	23.0
		Mean (b)	26.3	27.9	32.8	38.0	22.3
Salt in current year	None	2.5	25.7	29.1	32.6	37.9	22.2
		5.0 (c)	24.5	28.3	32.4	37.9	22.0
		7.5	27.2	28.3	34.1	37.7	23.8
		Mean (d)	25.8	28.6	33.0	37.8	22.7
	Half rate	2.5	29.1	28.5	34.1	37.3	23.8
		5.0 (c)	25.8	27.3	32.7	37.4	21.0
		7.5	26.2	28.5	32.2	37.8	21.6
		Mean (d)	27.0	28.1	33.0	37.5	22.1
Salt applied <del>Winter</del> Winter	2.5	26.9	28.4	33.1	37.2	23.0	
	5.0 (c)	24.8	28.2	32.5	38.6	22.1	
	7.5	27.8	29.0	34.4	38.5	20.5	
	Mean (d)	26.5	28.5	33.4	38.1	21.9	
In seed bed	2.5	27.9	29.2	33.7	37.9	23.1	
	5.0 (c)	25.5	27.4	32.6	36.7	20.8	
	7.5	25.6	27.8	31.9	37.1	24.9	
	Mean (d)	26.4	28.1	32.7	37.2	22.9	
Mean	0	25.5	28.4	31.6	36.9	21.8	
	2.5	27.4	28.8	33.4	37.6	23.0	
	5.0 (e)	25.2	27.8	32.6	37.7	21.5	
	7.5	26.7	28.4	33.2	37.8	22.7	
	Mean	26.2	28.4	32.7	37.5	22.3	

Standard errors (22 d.f.)	(a)	0.80	1.25
	(b)	0.39	0.62
	(c)	0.61	0.95
	(d)	0.37	0.58
	(e)	0.46	0.72
Per plot		1.61	2.50
%age		4.9	6.7

TABLE 1  
The Lower Potomac Experiment

1941

Date	Soil applied in previous year		Soil applied in current year		Soil applied in previous year	Soil applied in current year
	1940	1941	1941	1942		
1941	0.0	0.0	0.0	0.0	0.0	0.0
1942	0.0	0.0	0.0	0.0	0.0	0.0
1943	0.0	0.0	0.0	0.0	0.0	0.0
1944	0.0	0.0	0.0	0.0	0.0	0.0
1945	0.0	0.0	0.0	0.0	0.0	0.0
1946	0.0	0.0	0.0	0.0	0.0	0.0
1947	0.0	0.0	0.0	0.0	0.0	0.0
1948	0.0	0.0	0.0	0.0	0.0	0.0
1949	0.0	0.0	0.0	0.0	0.0	0.0
1950	0.0	0.0	0.0	0.0	0.0	0.0
1951	0.0	0.0	0.0	0.0	0.0	0.0
1952	0.0	0.0	0.0	0.0	0.0	0.0
1953	0.0	0.0	0.0	0.0	0.0	0.0
1954	0.0	0.0	0.0	0.0	0.0	0.0
1955	0.0	0.0	0.0	0.0	0.0	0.0
1956	0.0	0.0	0.0	0.0	0.0	0.0
1957	0.0	0.0	0.0	0.0	0.0	0.0
1958	0.0	0.0	0.0	0.0	0.0	0.0
1959	0.0	0.0	0.0	0.0	0.0	0.0
1960	0.0	0.0	0.0	0.0	0.0	0.0
1961	0.0	0.0	0.0	0.0	0.0	0.0
1962	0.0	0.0	0.0	0.0	0.0	0.0
1963	0.0	0.0	0.0	0.0	0.0	0.0
1964	0.0	0.0	0.0	0.0	0.0	0.0
1965	0.0	0.0	0.0	0.0	0.0	0.0
1966	0.0	0.0	0.0	0.0	0.0	0.0
1967	0.0	0.0	0.0	0.0	0.0	0.0
1968	0.0	0.0	0.0	0.0	0.0	0.0
1969	0.0	0.0	0.0	0.0	0.0	0.0
1970	0.0	0.0	0.0	0.0	0.0	0.0
1971	0.0	0.0	0.0	0.0	0.0	0.0
1972	0.0	0.0	0.0	0.0	0.0	0.0
1973	0.0	0.0	0.0	0.0	0.0	0.0
1974	0.0	0.0	0.0	0.0	0.0	0.0
1975	0.0	0.0	0.0	0.0	0.0	0.0
1976	0.0	0.0	0.0	0.0	0.0	0.0
1977	0.0	0.0	0.0	0.0	0.0	0.0
1978	0.0	0.0	0.0	0.0	0.0	0.0
1979	0.0	0.0	0.0	0.0	0.0	0.0
1980	0.0	0.0	0.0	0.0	0.0	0.0
1981	0.0	0.0	0.0	0.0	0.0	0.0
1982	0.0	0.0	0.0	0.0	0.0	0.0
1983	0.0	0.0	0.0	0.0	0.0	0.0
1984	0.0	0.0	0.0	0.0	0.0	0.0
1985	0.0	0.0	0.0	0.0	0.0	0.0
1986	0.0	0.0	0.0	0.0	0.0	0.0
1987	0.0	0.0	0.0	0.0	0.0	0.0
1988	0.0	0.0	0.0	0.0	0.0	0.0
1989	0.0	0.0	0.0	0.0	0.0	0.0
1990	0.0	0.0	0.0	0.0	0.0	0.0
1991	0.0	0.0	0.0	0.0	0.0	0.0
1992	0.0	0.0	0.0	0.0	0.0	0.0
1993	0.0	0.0	0.0	0.0	0.0	0.0
1994	0.0	0.0	0.0	0.0	0.0	0.0
1995	0.0	0.0	0.0	0.0	0.0	0.0
1996	0.0	0.0	0.0	0.0	0.0	0.0
1997	0.0	0.0	0.0	0.0	0.0	0.0
1998	0.0	0.0	0.0	0.0	0.0	0.0
1999	0.0	0.0	0.0	0.0	0.0	0.0
2000	0.0	0.0	0.0	0.0	0.0	0.0
2001	0.0	0.0	0.0	0.0	0.0	0.0
2002	0.0	0.0	0.0	0.0	0.0	0.0
2003	0.0	0.0	0.0	0.0	0.0	0.0
2004	0.0	0.0	0.0	0.0	0.0	0.0
2005	0.0	0.0	0.0	0.0	0.0	0.0
2006	0.0	0.0	0.0	0.0	0.0	0.0
2007	0.0	0.0	0.0	0.0	0.0	0.0
2008	0.0	0.0	0.0	0.0	0.0	0.0
2009	0.0	0.0	0.0	0.0	0.0	0.0
2010	0.0	0.0	0.0	0.0	0.0	0.0
2011	0.0	0.0	0.0	0.0	0.0	0.0
2012	0.0	0.0	0.0	0.0	0.0	0.0
2013	0.0	0.0	0.0	0.0	0.0	0.0
2014	0.0	0.0	0.0	0.0	0.0	0.0
2015	0.0	0.0	0.0	0.0	0.0	0.0
2016	0.0	0.0	0.0	0.0	0.0	0.0
2017	0.0	0.0	0.0	0.0	0.0	0.0
2018	0.0	0.0	0.0	0.0	0.0	0.0
2019	0.0	0.0	0.0	0.0	0.0	0.0
2020	0.0	0.0	0.0	0.0	0.0	0.0
2021	0.0	0.0	0.0	0.0	0.0	0.0
2022	0.0	0.0	0.0	0.0	0.0	0.0
2023	0.0	0.0	0.0	0.0	0.0	0.0
2024	0.0	0.0	0.0	0.0	0.0	0.0
2025	0.0	0.0	0.0	0.0	0.0	0.0
2026	0.0	0.0	0.0	0.0	0.0	0.0
2027	0.0	0.0	0.0	0.0	0.0	0.0
2028	0.0	0.0	0.0	0.0	0.0	0.0
2029	0.0	0.0	0.0	0.0	0.0	0.0
2030	0.0	0.0	0.0	0.0	0.0	0.0